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Issue 34 Nov 03



First

Athlon 64 system test

VS

Pentium 4 Extreme Edition

Intel strikes back

LCD screens
Worthy at last

Next-gen broadband
The pipes are getting fatter

DIY Wi-Fi antenna
The Pringles Can Project



Games tech

Doom 3 designer interview
Homeworld 2 engine room
Nokia N-Gage taken to bits
Online gaming consoles vs PC



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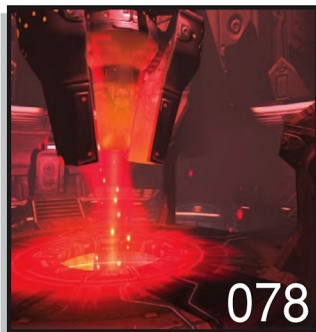
WIN

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A large ship's crane is lifting a massive blue container into the ocean. The container is being hoisted by a thick yellow cable. A large splash of water is visible as the container enters the water. Several crew members are visible on the deck, working with the container. The sky is blue with some clouds.

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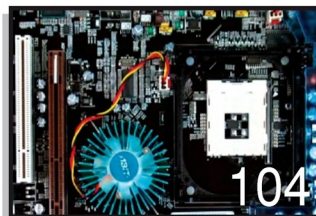
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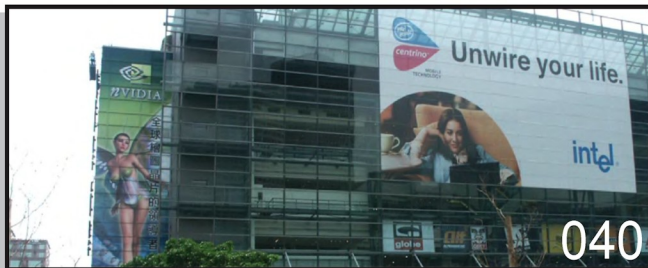
There's plenty of gaming services to choose from – and not just on PC. With Xbox and PlayStation 2 now swinging around in the online arena, gamers have plenty of ways to interface with the world of multiplayer joy. John Gillooly does some investigating into the deep world of the online game service.

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» Feature:

All thing Computex

040

If it has to do with computers, then it likely makes an appearance, be it in hardware, software or booth babe form, at Computex. Big names such as NVIDIA, ATI and Intel flock to Taiwan's megashow to brandish their wares at those with an interest. Which is pretty much anybody who goes to Computex. The only sensible action was to send resident superstar John Gillooly into the fore, to bring back some Atomic technology goodness



Feature:
Nokia N-Gage

044

If you haven't heard about Nokia's N-Gage, you probably don't have a mobile phone either. Or running water to your house, for that matter. We gave a less-than-operational unit to Dan Rutter to tear apart and analyse with his assorted tearing-apart tools, and we're sure you'll enjoy what he found. We did. Immensely.



Feature:
Broadband Technologies

048

We're sure you all know the benefits of high-speed Internet. That's why the uptake of ADSL is humming along nicely, and anyone who can get cable, has it. So, it should come as no surprise that behind all this super-quick information and amazing hardware is some fancy technology. Dr Carlo Kopp breaks it all down to the raw details.



048



022



028



X-Ray

LCD's Inside and Out

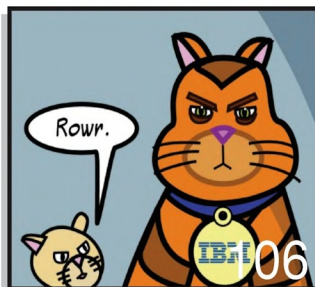
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The liquid crystal display. It's the doorway to a *Star Trek* future, where control panels are mounted on walls, and take input straight from the screen.

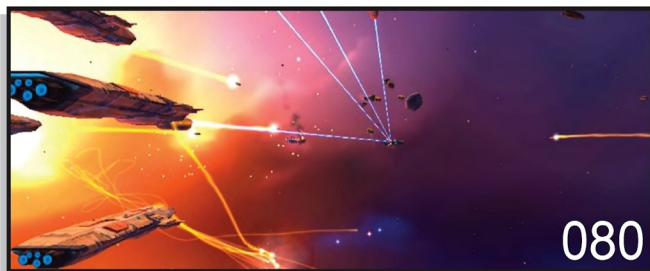
While we might obsess slightly over the details of temporal alignments and teleporter diagnostics, it's hard not to be interested in LCDs. So, this month's X-Ray will delve into the very heart of super-cool, TFT technology and unearth all there is to find. And your host? Why, it's Dan Rutter, the man who does it all.



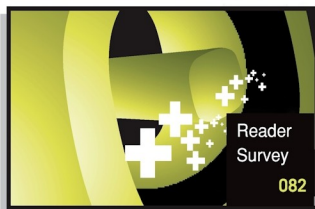
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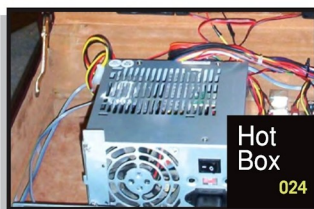


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Reader
Survey

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Hot
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024



096

Halo Invades



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www.microsoft.com/Games/Halo



Tossing our pickles



There's changes and then there's changes. Around here, we don't mess with what's working too much. Well, apart from cool big surprises like the now new and neat *Atomic* CD. That was a big one alright. But there are smaller background events. So small we call them 'evolution'.

Like, for example, extending the popular Aus eGamer section, from a column to a full page, starting this

month. We're the only mag in Australia or New Zealand to cover the pro gaming, online and LAN scene regularly, so we felt obliged to do a proper job of it, to serve the gaming community better.

Also broadening now is Moditsu. We figure that, by now, you already know how to wield a Dremel and slice and dice steel or aluminium into the right size and shape to install your plastic fish tank. Basic 1337 skills – check! So, we've started moving into funner areas of craftwork. Last month's home anodising tutorial was a nice example, as is this month's Cantenna project. As always with Moditsu – and *Atomic* in general, really, we're aiming to give you skills and knowledge to better equip you to make it through life as an unstoppable winner, and/or simply to pass a few idle hours on the weekend. There's no grander purpose that we claim than urging people to mess with stuff that's just asking for the messin'.

On the insidery bits, Tim McP continues to whittle on his little evolution stick. Since he's been onboard, *Atomic* has taken on a sharper look, which shows off the technology we're talking about just how we want. None of it is change. It's all evolution.

Atomic has been hitting the stands for almost three years now. It's been read by many of you good people for just as long. And you'd know – people grow and they evolve. If *Atomic* were exactly the same magazine as it was three long years ago you – and, frankly, we – would be bored with it. We're still absolutely true to what's core about being *Atomic*, just like you are, only now we like to think that we're a bit better at doing this job. Yay progress.

The way we make *Atomic* isn't rocket science. Nor is it seat-of-the-pants guesswork. Nor again is it swerving with every punch or mindlessly following the compliments. It's all of the above and more. Happily though, *Atomic* is easier to put together than the challenges the lads and lasses on other mags face. Us lot get to chuck stuff in the mag that we think is cool. Stuff that we like. That simple luxury simplifies the editorial process immensely. If there's no fun behind the mag, there's no fun in the mag. It's the McDonald's principal. See – the workers are always bright and happy, that's why the burgers taste so good.

As you'd know, though. Even perfection isn't perfect. There are some out there who like everything about McDonalds except the pickles. Well it's time to tell *Atomic* about its pickles. Yes, it's survey time. That magical time of the year when you tell us what you love and less-than-love. And we will listen. We know you'll give us the honest truth, but to tempt you we've scored over \$10,000 of prize entitlement. Page 82 is your Survey starting point.

So, toss our pickles until *Atomic* is as sweet as you want it.

Ben Mansill
Editor

atomic

MAXIMUM POWER COMPUTING

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» Boot sector

- Omega XP Catalysts 2.4.78
- ATI Control Panel 3.7
- NVIDIA 9x Detonators 45.23
- Omega 9x Catalysts 2.6.18
- ATI 9x Catalyst bundle 3.7
- NVIDIA XP Detonators 45.23
- NVIDIA NT Detonators 44.45
- NVIDIA XP nForce drivers 2.45
- NVIDIA 9x nForce drivers 2.41
- ATI XP Catalyst bundle 3.7
- VIA standard 4in1s 4.43
- SiS IDE drivers 2.03
- VIA Hyperion 4in1s 4.49p2
- SiS AGP drivers 1.17



No.05
Games Modkit

- SiS Xabre drivers 3.10.58
- VIA audio drivers 3.7
- Microsoft DirectX 9.0b
- Microsoft .NET Framework 1.1
- Microsoft VB6 runtime

Just some Microsoft updates added this month. We'll look to cull this list to the drivers people want the most, so send in your requests to cd@atomicmpc.com.au.

» Game browsers

- The All Seeing Eye
- Gamespy Arcade 1.3f
- Gamespy 3D 2.63
- GameArena COGS 1.1.11

You'll have trouble finding game mods to play online without using an online browser. To go hand-in-hand with the Head-to-Head this month, we've included a choice of game browsers, including Australia's own COGS.

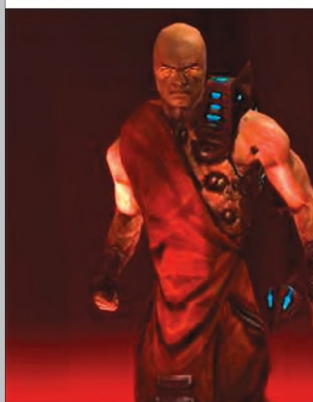


» Atomic CD guide

Take one game. Add customised content. Play it to death. Sounds enjoyable? Take a look at this month's Game Modkit CD.

Working stuff out on your own is fun, especially if it involves creating something special – like a game mod. It's a joyous activity, sorting through resources, scavenging for information, crafting code and making 3D models. It can also be unfun – like discovering that your brother is really an Amish secret agent and he's holding your electric razor at pitchfork-point. *Atomic* is here to make sure it all stays exciting, with the *Atomic* Game Modkit CD. Dig in.

» Quake 3: Arena



- Q3A point release 1.32
- Q3A source code 1.32 (link only)
- GtkRadiant 1.2.11 (link only)
- GtkRadiant update 1.2.13 (link only)
- *Atomic* Q3A mod guide 0.1

We all like id Software, for a heap of reasons. One of those is that it's happy to release the source code for its games so modders can go absolutely berserk. id's Quake 3 Arena, although used more for benchmarking, has seen its fair share of community-created modifications. A community you can join. We've included a basic guide to get you started in the world of the Quake 3 mod, as well as the files (or links to files) you'll need to get set up. Note that for licensing reasons, we couldn't include the source code or GtkRadiant map editor on the CD – there are links provided instead.

» Half-life



- Half-life patch 1.1.1.0
- Half-life full SDK 2.3
- Valve Hammer Editor 3.4
- Zoner's Half-life tools 2.5.3
- *Atomic* Half-life mod guide 0.1
- Liblist.gam template file

One word – well, two

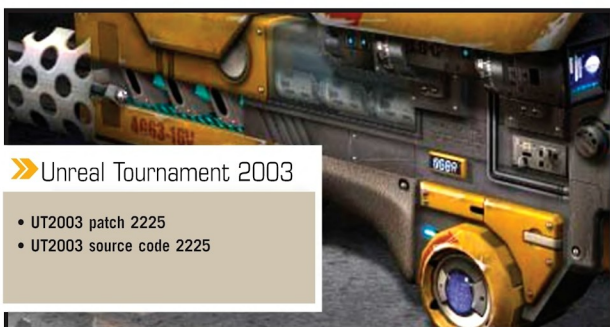
hyphenated – Counter-Strike. If the flaming forest of success that is the mod of the decade doesn't get you wanting to code, then you just weren't meant to make mods. Others have tried and failed to duplicate the formula – it's probably better to be original. And here's your chance. Along with a starter's guide, we've included on the CD everything you need to get started on the next best thing since Day of Defeat, as well as the latest Half-life patch and Hammer map editor.



» Battlefield 1942

- BF1942 patch 1.45
- BF1942 unofficial SDK
- Battlecraft 1942 1.1b

Probably the most recent story of supreme modification, Battlefield 1942 is host to Desert Combat, which, much like Counter-Strike, is played online more than the game it is built on. While we weren't able to include a guide to help you start your BF1942 mod career, there are plenty of resources online. If you do decide it's your bag, we have the unofficial SDK (made by the community), the latest patch and Battlecraft, the official map editor (which requires the Microsoft updates also on this CD). Check out www.planetbattlefield.com for more tools and tutorials.



» Unreal Tournament 2003

- UT2003 patch 2225
- UT2003 source code 2225

UT2003 is incredibly modder-friendly. Not only does the game come with everything you need to write mods and make maps, the programming language is straightforward and very similar to Java. There's no guide on this month's CD for it, but if you check out at <http://udn.epicgames.com/pub/Technical/UnrealScript> **Reference**, you'll find a comprehensive tutorial on UnrealScript. If you're familiar with Java, you should have little trouble getting your head around it. For those who are not sure how to extract the source from the game files, we've included them on this month's CD, along with the latest update.

» Compression tools



- WinZip 8.1 SR-1
- WinRAR 3.2
- WinAce 2.5
- 7-Zip 3.08.04 beta

Well, until the age of the isolar chip and unified compression standard, we'll have these suckers on the CD each month.

They're choice programs though, great for opening a number of compression formats, some of which are used to store files on this month's CD.

» Quick guide

Battlefield 1942

- BF1942 patch 1.45
- BF1942 unofficial SDK
- Battlecraft 1942 1.1b

Boot sector

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- GTK+ 1.3.0
- Milkshape 3D 1.6.6a

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- Atomic Half-life mod guide 0.1
- Liblist.gam

Miscellaneous

- Guide: The art of mod 0.1

Quake 3 Arena

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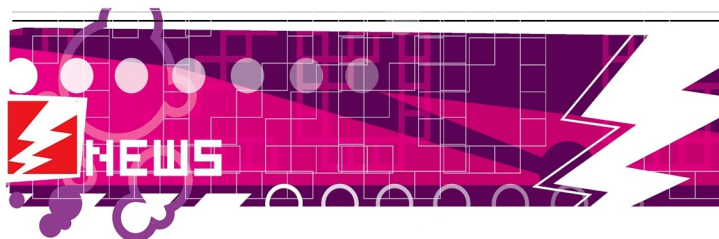


SHORT CIRCUITS

◀ Ahead has found time to do a solid job of patching Nero 6. If you can remember, there was a critical flaw in the program that had the potential to erase all data off your hard drive. Although it was addressed, Nero 6 has remained home to a number of bugs. If you're using Nero 6, or you've been using Nero 5 for fear of what it might do to your system, the patch should make the difference. Web your way to www.nero.com and download the update.

◀ Eventually robots will replace humans for the majority of menial tasks. You know – mining, space exploration, deep-sea excursions and, of course, correctly discerning ripe watermelons and harvesting them. The robot is courtesy of Israel and the US, with an Israeli magazine naming the fella 'A Water Melon Loving Robot'. . . all we can say is, 'holy crap'. At the moment, the robot can correctly identify a ripe melon from an unripe one 85 percent of the time. You'd expect maybe a little robot with pincers, but no, this sucker looks like a bright red Tonka truck. Well, we suppose researchers have to spend their time doing something between ABIO AI code compiles.

◀ According to Kevin Warwick, a cybernetics professor from the University of Reading, we'll all have radios in our heads by 2010. More accurately, we'll all be running around with wireless devices in our brains capable of communicating with machines as well as other humans. Warwick is also convinced that once the brain adjusts to its capabilities, it won't be able to function properly without the implant. But this probably has more to do with the fact someone has been poking your grey matter.



64 bits of rhetoric

Intel delivered the business while AMD's launch was remarkably unspectacular.

Intel gazumped AMD and will go down in history as the first company to launch a processor targeted at gamers and performance freaks. At Intel's Fall Developer Forum in San Jose, US, the Extreme Edition Pentium 4 was one of the surprise announcements.

A week later AMD coordinated its worldwide launches of the Athlon 64 to coincide with Computex. The Sydney launch was held at Star City Casino, and had a Halo LAN competition as a prelude to the launch. Unfortunately the beta code used for the competition was less than perfect, and was not a flattering way to demonstrate the power of the Athlon 64.

The launch in Taipei's New York New York Department centre (a building sporting an enormous Intel Centrinio banner) was a motherboard and chipset industry love-in, with AMD's chipset partners being rolled out to praise the Athlon 64 and herald a new age of digital media processing.

It was rare to see such tough competitors walk onto the stage and, ULI's president Alex Kuo excepted, not take the opportunity to talk up their products. Instead, VIA CEO Wenchi Chen, SIS president and CEO Michael Chen and NVIDIA's VP of desktop platforms Drew Henry all praised the processor. However, the unique part of the Taipei launch ended at that point and the gathered group of industry heavyweights and international tech journalists were subjected to the same speech as at the Sydney event. The hall emptied quickly when we realised we were in for a bout of marketing-fuelled rhetoric rather than something with any technical substance to it.

AMD emphasised the Athlon 64 FX series of CPUs, while admitting the only difference between it and an Opteron 100 series CPU was the number of HyperTransport links. It was ignorant of the fact that there were no desktop targeted Socket 940 mobos to be seen on the show floor, but dozens designed for the everyday Socket 754 Athlon 64 CPUs. AMD said it could quickly ship large volumes of the Athlon 64, and gave a rough plan of tens of thousands shipped in the next two months, and millions early next year.

Most of the motherboard manufacturers that talked to *Atomic* during Computex were planning on initially bundling CPUs with their mobos to ensure sales. As the Athlon 64 is not expected to be easy to find in stores for the next few months, users will have to buy the two products together.

At the moment most of the boards are based on either VIA's K8T800 or NVIDIA's nForce3, but a handful of manufacturers are also using SIS' 755 chipset. Expect boards to start shipping soon, but also to be in short supply until AMD starts moving the CPU in serious volumes.

Intel, on the other hand, made sure that the Extreme Edition Pentium 4 is compatible with its current socket and chipset. Like the Opteron rebadging that AMD has done for the Athlon 64 FX, Intel has taken the Xeon, pumped the front side bus to 800MHz and dropped multiprocessing support to create the Extreme Edition.

The long awaited launch of the Athlon 64 happened with even less impact than the minor earthquake that hit North-eastern Taiwan (which we slept through). It appeared AMD had the CPU right, it's just a pity it didn't want to tell anyone anything interesting about it.



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Australian Game Developer's Conference 2003



Hovember brings many things: summer, heat, sweat. Summer. It also brings AGDC 2003, also known as the Australian Game Developer's Conference 2003. It's a massive gathering of local and international game developers and publishers, as well as amateur talent from schools and universities. It's a chance for professionals and those looking to get into the industry to learn from colleagues and veterans.

With *Atomic* being the official media sponsor, and considering the content of AGDC is right up our alley, the only sensible course of action was to give it some coverage. So, during the period 20-23 November, we'll be doing all things journalistic at the conference.

Starting out with just eight sponsors in 1999, the AGDC has quickly grown into 'the event' for the Australian games industry, with this year's conference showcasing 19 companies including Intel, NVIDIA, ATI, Xbox, Sony and discreet, as well as publisher Atari.

AGDC and events manager, Pon Chaleune, for the Academy of Interactive Entertainment, the company organising the event, said that the calibre of speakers was outstanding and included: Seamus Blackley, formerly of Xbox but now vice-president of development for Capital Entertainment Group; Adam Lancman of Atari Melbourne House, Adrian Curry of Xbox, Andrew Wilson from EA, and Ian Fischer, lead games designer at Ensemble Studios. Ian Livingstone of EIDOS UK will also be present to give a speech on the benefits of publishing in Europe. Ms Chaleune mentioned that developers in Australia tend to approach US publishers, so the keynote should be of particular interest. Livingstone also happens to be the first UK speaker to be present at the AGDC.

Emerging technologies, such as wireless gaming, will also be embraced at this year's conference. Ms Chaleune emphasised that the AGDC has 'met those changes' in technology. Several Nokia employees from different parts of the world will be at the conference to discuss the N-Gage, the company's foray into the mobile gaming market.

AGDC is all about learning, and it's no surprise that there will be a strong academic element in the form of a summit, *Playing With Our Minds*. Among other things, it will showcase research and theories on interactive technology, and how it has affected Australia.

It's probably one of the most exciting gaming events to happen in Australia this year, and *Atomic* will be sure to cover all the juicy details.



WHAT'S HOT



- Quest for glory – trial by fire
- Aussie lamb exports – a shipload of sheep
- Athlon 64 – 64-bit for the masses
- RADEON 9800XT – a new kind of fast
- Taiwan Beer – best beer in the East

WHAT'S HOT



- Steam – trial by bandwidth
- Doom 3 – a shitload of creeps
- Athlon 64 FX – expensive and poorly supported
- RADEON 9800 PRO – the king is dead
- Budweiser – worst beer in the West

atomican

At the recent World Cyber Games Australian finals held in Sydney a Media Challenge was laid down, with Logan, John, Tim and Mordain representing team *Atomic*. Despite only one other team turning up for the event, much w00tage was had with a victory by *Atomic* over *PCA*. Team nFI are reportedly shaking in their boots. Check out the report over at

www.atomicmpc.com.au/forums.asp?s=1&c=1&t=20830.

It's getting kind of cramped here in the *Atomic* Superhero cave. Prae's computers are in every room, Virt's experiments have taken out half the base, Phr33x's capes are starting to smell a bit, Gramyre's g-strings are piled up to the ceiling, Mael insists on parking the forklift in the living room, and I'm sure I'm contributing to the problem in some way as well. I just hope that the excellent new Superheroes Virul, chrisg, anzs_kickass and the dude (forums.asp?s=1&c=1&t=21515) have some kind of excavation skills because there is seriously going to be some resolution here. Maybe we could just annex a Pacific Island somewhere. But with a group like this, we're sure to defeat the SS wherever they are.

September 19 was celebrated with great abundance, as the forums commemorated International Talk like a Pirate Day. Yardsarms were scaled, bilge rats were tossed overboard, and spammers were forced to walk the plank. Even official post rankings were changed to better fit the tone of the day. For all those scurvy naves to be able to get their hands on some fine booty, what better way than pirate pick up lines contributed by nm and others in forums.asp?s=1&c=1&t=22336. Guaranteed to work.*

Atomicans come in all shapes and sizes. Young, old, tall, short, hyper. It was only a matter of time before even Atomican offspring would get into the act. In forums.asp?s=1&c=1&t=21483, Propellerhead tells us about his four year old daughter installing her first CPU (collective aaaahhh). We're all waiting for the next stage when she overclocks her first video card.

And remember, it's always good to know the difference between real cakes and toilet cakes, and knowing which one is good to eat and which isn't.

Wilkshake

POTM 31

www.atomicmpc.com.au

Zebra showed us all just how deep the love can be – for an optical drive. His Official Liteon LDW-401S Thread: www.atomicmpc.com.au/forums.asp?s=2&c=9&t=3591

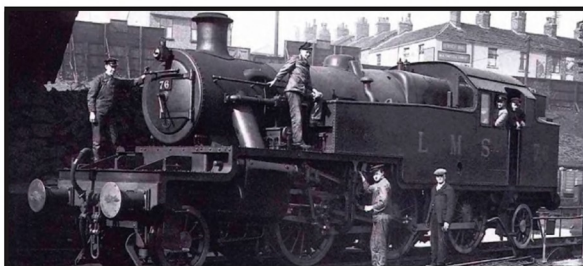
Reminds us all that there's no such thing as too much information.

Zebra scores the deeply lovable Logitech MX700 mouse for his contribution.



Valve lays some pipe, but are gamers opening up to the idea?

Come one and come all, welcome to the new, improved and extended AusEgamer! Giving us a little more room to breathe this month we are taking a look at the trials and tribulations involved in the release of Steam and Counter-Strike 1.6. Unless you've been living in a monastery having taken a vow of ignorance or the like, Steam is the biggest news to hit the gaming community this year. Hold on as we take you through a strange experience into Valve's foray into online domination.



Steam – bringing the online Half-life community to its knees. We managed to get in contact with the team responsible for Steam, and they blamed it on a crappy release valve.

Millions of geeks, having salivated over their keyboards for hours, clicked the small download icon. The wait for Counter-Strike 1.6 has been a long, arduous one, finally it had all paid off. Booting up Steam, Valve Software's new content delivery system for the control of Half-life based online gaming, the people were ready for a new kind of experience. This was where the nightmare began.

For the uninitiated, the new Steam system is a hybrid between a ServerQuery like tool and a realtime update centre for Half-life. Having sat late into the night in front of tiny screens waiting for the Steam setup to trickle down a cable connection at ridiculously slow speeds from a strange Hungarian mirror (finding a working local mirror proved impossible) people got their first taste of this, Valve's latest offering.

The most noticeable option of Steam setup is that of retaining your current Counter-Strike 1.5 setup and creating an entirely new copy of CS just for Steam use. This option is quite precarious as it is prone to spontaneous crashes during the copy phase. Now, a regular setup program would crash quickly and quietly and force a restart, but not so Steam. After jiggling a few cords and trying to coax the setup back into operation you're left having to end the task. After cutting your losses and restarting the process anyone would be surprised to find that Steam does not register whether the copy process was successful and thus boots straight into the program menu. Those keen to join the vast list of servers will simply be met with an 'Unable to open' message. A quick uninstall will show you further grid with the registry retaining your Steam settings, forcing you to uninstall again and manually remove the registry entries!

With such an experience never before felt through the community, after having wrestled with the great beast of Steam, the program menu booted up nicely with a large list of servers and an array of buddy-list features, it only took a shade under an hour and a half to get there.

So what can you learn from this simple tale of woe? Simple: Steam may be a revolution for the Half-life community but it is in no way a step forward. If anything the experience has taught me a deep respect for the HL community and its ability to manage not only the MODs but competitions it has spawned. For the past five years it has been the third party developers who have given us the tools with which to wage online war.

The question that begs to be asked is why Valve has forced Steam upon us? Most speculation concerning this question is the upcoming release of premium Steam accounts at a monthly fee. This strikes any gamer as an absurd notion. Having paid for Half-life five years ago why should we be forced to not only use Valve's system but also to do so purely for their financial benefit?

There is no question that Steam provides a full suite of tools for online gaming but it is definitely not breaking any new ground. Everything from the buddy list to the server listing have all been done before. Are we ready to make people like those behind ServerQuery (www.serverquery.com) completely redundant in the face of Valve's financial ambitions?

It is with much trepidation that I have written the above. Steam, while a tedious program at first, attempts to bring together the community under one simplistic program and friends system. Whether this is being done for financial benefit or for that of the community remains to be seen but in the end it is still a stepping stone (however unsteady) to the legitimisation of online gaming as the future of both player and spectator entertainment.

Dan sees The Future, again. . .



Hold onto your paperbacks folks, Daniel Rutter says they'll eventually become antiques.

I've taken an awful lot of photos. Maybe well over a hundred thousand by now. I'm not sure, because most of them have been product shots of one kind or another, and fiddling around with lighting and exposure and angle means that several images go to the bit bucket for every good one I bother to keep.

But I don't think I've taken more than 20 film photos in my life.

I'm a member of a new generation – people for whom film photography feels weird and old and, well, icky.

Put the flamethrowers away, silver halide lovers. I know all of the practical and artistic reasons why film is still

screens look lousy and their batteries don't last long enough and you can't get enough content for them!

Yep.

Also – rewind 100 years – automobiles are too expensive and they break down and there's practically nowhere you can buy fuel and there aren't nearly enough good roads to drive them on!

It'll be a while before we have an e-book that can cope with being whacked with a hammer. We may never have one. But they'll still beat out paper, sooner or later, and the kids'll think anyone reading a wood-pulp book looks rather retro.

Well, they will as long as the dead

... they'll [e-books] still beat out paper, sooner or later, and the kids'll think anyone reading a wood-pulp book looks rather retro.

relevant and sensible. I just don't want to use it.

What else is going to go the way of film photography? What else is going to have a new generation of people who do things the *New Way*, and consider the *Old Way* to be up there with stagecoaches and hitting your washing on a rock?

Well, there's books, of course. And every other kind of current media delivery system, except P2P applications.

Old farts like Kurt Vonnegut (he said it, not me) may be convinced that books 'involve our hands and eyes, and then our minds and souls, in a spiritual adventure'.

But I read that passage in a copy of *Timequake* that spat out its bookmark half a dozen times while I was reading it, and also spat out the Post-It I stuck in there to mark the page the quote came from. And it fell open anywhere but where I was up to, and it wouldn't stay open without supervision. At least the binding held.

But electronic books are too expensive and too fragile and their

hand of corporate-owned copyright doesn't strangle e-books, along with other portable media devices. If you think legal prohibition of sensible things can't hang on for decade after decade and even get worse and worse, I invite you to try smoking a joint in public.

If we assume that the eventual legislative equilibrium reached by the media dinosaurs and the Copyright, Schmopyright crowd doesn't put MP3 players in the same category as bongos, though, then I think a lot of separate media objects are going to become anachronistic.

Books, CDs, DVDs; all will collapse into a single general purpose solid state storage lump you carry around with you, or possibly into a nebulous data-cloud you can access from wherever you happen to be.

If the communications companies don't make network access into a service that's more like water than like a phone line, then ad hoc mesh networking devices could likely to walk right past them and eat their lunch.

Then, the technology that makes your digital camera and mobile phone

and music/video player work, storing and retrieving and transmitting data by some means and in some place not immediately obvious to the user, will also help make everyone *else's* gadgets work.

And if Sony won't make devices that work with the mesh, you can bet that Sanctified Griffin Manufacturing Corporation of Guangzhou, China will. And they'll be about as easy to keep out of a country as are all-region DVD players today.

What else is going to look Old School in short order?

Well, youth employment be damned, the supermarket checkout as we know it has got to go.

Radio Frequency Identification (RFID) tag prices are dropping, so here come non-stop high-efficiency trundle-through checkout lanes, just like the E-Tag lanes on toll roads.

With technology to avoid 'tag collision', a trolley full of products, some identical, can be scanned in one go. And with an RF-enabled credit card, you can pay for that trolley-load by waving your wallet (or your arse, assuming a back-pocket wallet location) past another sensor. You'll just have to look out for jokers dropping stuff you don't want into your trolley.

There's more to life than mere efficiency, of course. If you like reading books or dawdling around a little shop full of interesting things or watching *Casablanca* in all its black and white, 24 frame per second, 4:3 aspect ratio, low resolution glory in a cinema with sticky carpet, then I hope you'll always be able to do it.

Efficiency is one hundred per cent desirable when it's applied to things that you *don't* like doing, though. And I think waiting for your photos to come back from the lab, taking up shelf after poorly-organised shelf to store data that can fit on one \$200 hard drive *already*, and waiting in line at the supermarket, all qualify.

All this is small potatoes, though.

Next month: Why every single thing you own today may look as high-tech as a stone axe by 2050 AD.



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The dazzling speed of diamonds



It's plausible that, some years down the track, your partner may show their love by giving you something made of diamond of a very different breed.

I can see it now. The latest Intel ad slips across your plasma wide-screen TV, depicting the new 50GHz beastie and how it will do everything but feed the dog, and at the end will be displayed a play on words of one of the world's most recognised clichés, 'Diamonds are a geek's best friend'.

Because, in the future, PCs will be made from diamond.

Regardless of the brilliance of the boffins at Intel and AMD, they cannae change the rules of physics. The use of silicon as a semiconductor for integrated circuits has given us the technological world as we know it today. But silicon has its limits, limits that are rapidly approaching.

Diamond . . . has the potential to create transistors running at Ridiculous Speed.

There will come a time soon when, no matter how refined the process, the silicon base in which our CPUs are etched will simply collapse and melt under the heat generated by the ever increasing demand for speed. And when this happens, a new and more efficient semiconductor will be needed.

That's not to say we don't have that already. There are many other excellent semiconductors used in the application of integrated circuits that perform far better than silicon. Gallium arsenide is perhaps the most important and is widely used in the production of mobile phones for its superb qualities, but it's expensive and complex to manufacture on the scale required to support something like CPUs.

Instead, the industry has been looking towards the golden child of semiconductor elements – lumps of carbon that go by the name of diamond. Diamond, as it happens, has the highest thermal conductivity of any known substance, meaning tremendous amounts of heat – the likes of which would liquify silicon in an instant – can pass through it without causing damage.

The problem so far has been not in the prohibitive cost of diamond – diamonds are neither rare nor costly, a fallacy generated by the infamous DeBeers cartel that controls supply and even manipulates demand worldwide (DeBeers is a monopoly that puts Microsoft to shame) – but rather the problem lies in being able to produce diamond wafers that could be used in the manufacture of integrated circuits.

As diamond is simply pure carbon, formed under intense pressure and heat, its cheap manufacture has been a holy grail for decades. Even as far back as the 1950s companies like General Electric put massive funding into research on the production of diamonds. They partially

succeeded – today industrial components such as drill bits are coated with a diamond 'dust' to improve effectiveness, but the cost of manufacturing anything larger, such as a solid stone, let alone a large wafer, outstrips even DeBeers' inflated prices.

Until now.

Two companies in the US, Apollo Diamond and Gemesis, are at the forefront of producing diamonds so pure they are more 'diamond' than the naturally occurring gems. Between them they are pioneering two different yet equally effective techniques of mass producing diamonds.

Gemesis pumps graphite and a diamond sliver to 'seed' a new stone into a highly pressurised (some 58,000 atmospheres) chamber and heats it to a warm 2,300 Fahrenheit. Three days later, you have a pretty gem. Apollo Diamond uses a technique known as chemical vapor deposition to create large diamonds suitable for cutting into wafers by heating hydrogen in a near vacuum at some 1,800 degrees Fahrenheit until a plasma is formed whereupon carbon particles precipitate down, gradually forming a diamond layer by layer.

And they can produce them for as little as \$10 each. Not surprisingly this has made DeBeers executives pale with fright, but the goal is not the gem market. Rather the gems are a stepping stone to the real money spinner – the ability to mass manufacture diamond wafers large enough for the production of ICs.

And you very much want them to do this. While it's early days yet, diamond when doped with a conductor (such as boron), has the potential to create transistors running at Ridiculous Speed. Imagine a 50GHz diamond CPU (just for starters) combined with gigabytes of memory capable of running at *core processor clock* speed, for no more than you pay today. None of this 400MHz or 800MHz bandwidth baloney, you got a 50GHz CPU? Try a couple of gigs of 50GHz memory to go with it.

You can pick your tongue up off the keyboard now.

And this is just the beginning.

Understandably, such speeds will require a distinct change in motherboard and bus design for them to be able to handle it – this will likely include optical pathways and, given memory controllers are moving to the CPU as with the Opteron, simply plugging diamond memory directly into the CPU block. Bottlenecks will be completely removed between memory subsystems and peripheral busses. Who needs AGP when you can plug in a GPU to access main memory just like the CPU does.

The large amounts of heat will need to be dissipated too, and since the mass production of diamonds will make stones of various sizes cheap and accessible, what better material could there be for use as a heatsink? The best thermal conductor known to man, whizzing away heat from your diamond CPU. Now you'll really have something to show off through the window of your case mod – a massive sparkling rock that puts your partner's engagement ring to shame.

Romantics will have to find another stone to express their love, because diamonds will be ubiquitous and forever associated with the technological leap they enabled. Indeed, the future of computing looks positively dazzling.



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Guns and ammo

Are games making Tim Dean violent? Or is it just the queue at the Post Office?

You know, for the first time in my life, I find myself agreeing with the NRA. Yeah, the National Rifle Association – you know, the one with Charlton Heston doddering around claiming the rational and reasonable people who want to take from him the military-grade weapons that contributed to the 28,874-odd firearms-related deaths in the US in 1999 (that's around 79 per day) will need to pry them from his cold dead hands. Yeah. Them.

And, as I said, I find myself in agreement with them – well, at least over just one point. This very fact makes me want to have a shower. Nevertheless, the point is the claim that the NRA and the

OK, with that out of the way, I do think the VPC has hit on a small part of a much bigger point about the effect violent games have on people, and specifically on young people. There are about as many papers outlining the possible deleterious effects of violent media, including TV, movies, music, and now computer games have on our behaviour as there are papers on the positive/negative effects of marijuana. And there are just about as many of these reports swinging both ways in both debates. So even though the reports have yet to paint a consistent picture of the effects of violence in games, it's not hard to see there are a

But what is the impact, then, of a game where you exercise your volition to kill, but then you don't suffer any of the same permanent consequences you get in real life? It's like only one half of the equation – the bad half. No wonder policy makers are cynical.

On the other hand though, and this is where the studies can be of benefit, there is plenty of research indicating there is a very significant difference in violence in a realistic context, and violence in an obviously fictional, cartoon or slapstick context. Think *Road Runner* – that sadistic bastard of a bird.

Finally, what about death? We already have a screwed up concept of death in our culture. We think of it as a thing to be feared, without realising what we are scared of is the loss of 'self' or 'personal identity'. The concept that freaks people out is that *they* won't be around any more. Wiggy. In fact, if you really dig down, as psychologists and philosophers are known to do, you see that it is our illusory sense of identity that comes from a continuity of experience that is under threat. The thing that's dying, well, it's not really there in the first place.

So now we have these games where death is detached from the depth of complex consequences and psychology that surrounds it in real life. You run over someone in GTA 3 the first time, and it might creep you out a bit, but when you do it the hundredth time, there's not even a passing thought that accompanies the blood streaked skid mark.

But – and there's always a but – studies have also shown that we don't seem to perceive death in games, or on TV or other fictional situations, in the same way as we do in real life. It's kind of like that cartoon violence thing again. In fact, studies show that violence on the news can have a much greater emotional impact on young people than far more graphic violence in other fictional media.

Hmmm. Complex.

And frankly, I'm over it. I'm ready to wrap this up, head home, and blow something up in a swath of devastation. Bye now.

what is the impact of a game where you exercise your volition to kill, but then you don't suffer any of the permanent consequences?

US firearms industry is using computer games to sell guns.

The claim has been made by the Violence Policy Center (www.vpc.org), an organisation for which I normally have the utmost respect, in its publication of December 2000, entitled *Why the Firearms Industry Wants Their Video Games on Your Child's Wish List*.

The response from the rocket scientists over at the NRA is illuminating, with its cunningly engineered argument against the most salient points of the report: 'You're looking at just another half-baked report from people who won't stop until all firearms are illegal', said NRA spokesman Bill Powers. Pow. Got 'em there tiger.

Anyway, despite our agreeing that the firearms industry is not using computer games to sell guns to children, we agree for very different reasons.

The reason I disagree with this claim is I can't imagine the NRA or firearms industry in the US are intelligent enough to figure out a way of encouraging the games industry to develop games specifically tailored to sell guns instead of developing games that sell the most copies. And I don't think the two are necessarily related.

few points that would clearly make the policy makers out there suspicious.

For example, in many games, violence is explicitly the only solution to a given problem, and non-violent means are not even presented as an option. Surely this would warp young minds? Well, I don't know that it necessarily would. In fact, I think if you're given a non-violent and a violent solution, then the choosing of the violent option would have a greater significance to your way of thinking than just following the rules or limitations of a violence-only game.

On the other hand, one of the most important lessons in your life is the understanding that your actions have consequences – and sometimes those consequences are permanent, and can't be taken back.

Now, games are a fantastic platform for teaching the idea of action-reaction, and cause-effect. That's why I like them more than watching TV. The interactive nature is specifically wrapped in the idea that you are the protagonist, and you exercise your volition to make things happen. You can really *feel* the link between freedom to do things, and seeing the effect they have. Magic.



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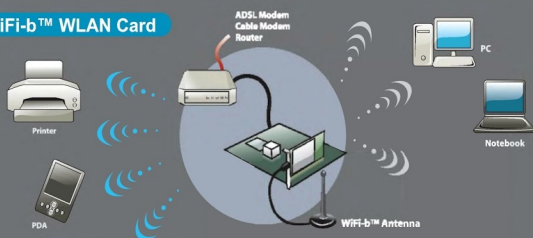
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1 EL SERIAL ATA CABLES

SUPPLIER: PC Case Gear

WEBSITE: www.pccasegear.com.au

PHONE: (03) 9568 0932 **PRICE:** \$19 (50cm); \$22 (75cm)

Serial ATA is still a fairly new technology, but mods have already made their mark. Available in sizes of up to 75cm in length, these transparent SATA cables have an EL wire run right up the middle, giving off a trippy glowing effect. The SATA cable has an inverter, but it's attached to a good length of power cable and supplied with double-sided tape and screws, so keeping it out of sight isn't difficult. Although flashy items are common these days, these data cables are strangely attractive.

3 USB FLASH DRIVE PAVO PEN

SUPPLIER: PC Case Gear

WEBSITE: www.pccasegear.com.au

PHONE: (03) 9568 0932 **PRICE:** \$125 (128MB); \$195 (256MB)

Other than storing data, there isn't a whole lot more you can do with USB drives. The rather innovative PAVO Pen is, yes, another USB drive, but not an ordinary one. This is a high quality celluloid pen and comes with a fill replacement and USB extension cord. It has a little weight to it though, so depending on your pen fantasies, this is either good or bad. The otherwise well-designed gizmo is available in 128MB and 256MB.



2 CREATIVE WEBCAM NOTEBOOK

SUPPLIER: Creative Labs

WEBSITE: www.australia.creative.com

PHONE: (02) 9021 9800 **PRICE:** \$99.95

We all like to spy, admit it. How about becoming a spyee? This baby was made for notebooks, as it mounts to the thin screen as a clip. Arriving with a small carry bag and itself (with the attached USB cable), this is one tiny cam, with the main body measuring only a tad larger than a AA battery. It produces surprisingly good images, too, with all the usual video tweaking options. Easily transportable, great quality and easy to use – this is portable spy-on-me goodness at its peak.



4 USB CUP WARMER

SUPPLIER: Anyware

WEBSITE: www.anyware.com.au

PHONE: (07) 3856 3999 **PRICE:** \$15

Naturally, we're against heat until, that is, it comes to our hot morning (4pm) caffeine hits. At LANs, bar from missing the next round of kill-the-fucking-camper, there's not much worse than an hour-old cold coffee drink. So, here's a cup warmer. A USB cup warmer. To a degree, this device works, keeping the drink on the warm side of things (mmm, warm Jolt). Though if you don't have a foam cup handy, we found it more useful as an insane body part warmer.



5

AEROGATE I

SUPPLIER: Cooler Master

WEBSITE: www.cooler-master.com

PHONE: (03) 9543 5855 **PRICE:** \$awaiting response

Fan controllers are certainly moving out of the minority and becoming more mainstream. Pushing that is the Aerogate I, with its ease of installation and simple operation – it supports up to four fans, and looks the part. Additionally there's an array of three coloured LEDs behind each dial (red, green and blue), so when you hit the 'color' button, the colours behind each dial cycle respectively, including off (whoa). This is a no-frills – albeit not bad looking – fan speed controller that simply does its job.

THERMALTAKE LANFIRE

SUPPLIER: Thermaltake www.thermaltake.com.au

WEBSITE: Anyware www.anyware.com.au

PHONE: (02) 9879 5788 **PRICE:** \$260

Looking rather Thermaltakey, this lightweight, medium tower has screwless satisfaction – one clip to hold all PCI/AGP cards. Other than that it's standard – an aluminium case missing a PSU. It's fitted with four 80mm case fans, a rheobus, front pass-through USB and FireWire, lockable front and irritating EL lights – thank God they're nukeable. Drive bays consist of three 5.25in, and four 3.5in (two internal) bays. One annoyance was the lack of a sliding motherboard, but overall, a decent-looking case that's lightweight and ready for transport.



6

CORSAIR TWINX1024 4000PRO

SUPPLIER: Altech

WEBSITE: www.altech.com.au

PHONE: (02) 9735 5655 **PRICE:** \$760

This unique kit contains a pair of Corsair's new XMS ProSeries TwinX DDR500 512MB sticks. Each has LEDs that flash when their memory bank is accessed, making it easy to see if your system really runs in Dual Channel. Performance wise, Corsair guarantee these to run at 500MHz, and we managed that on the Dual Channel PX865PE Pro II board and reaped a jaw exploding score of 5232MB/s in SiSoft Sandra's (2003 Pro) Int ALU memory test. Beefy in looks and performance – set your sails for the new stick-spanking V12 kit of DDR.



7

BOMM CUSTOM GRILLS

SUPPLIER: PC Case Gear

WEBSITE: www.pccasegear.com.au

PHONE: (03) 9568 0932 **PRICE:** \$6.50

Hot grillin' action, there's nothing quite like those readily available skull/dragon/alien shaped objects that arouse the geek in us all. These inexpensive 80mm custom fan grills are available in black, silver and gold, but don't help when it comes to quashing the fear of multi-digit loss. There's a sizeable collection of designs, and they won't warp from the almighty bend in the space-time continuum from your fan farm. Grill me a breeze and serve a shiny dragon.



8



BlackMagic V2



TECHNICAL DETAILS

- AMD XP 2400 @ 2240MHz
- 512MB DDR
- MSI K7T 266Pro2-RU
- Hightech RADEON 8500 Retail
- 40GB 7,200rpm Maxtor
- 2GB Seagate
- 800MB Maxtor (window mod)
- 16x Lite-On DVD
- Lite-On 52x/32x/52x
- Antec True Power 540W
- 5in TFT Color LCD
- 40cm x 2cm transmissive blue LCD
- Seven fans in total and some purple neons... and the rest.

The resurrection of **BlackMagic** began almost as soon as V1 was completed. After receiving a number of comments – positive and negative – I went back to the drawing board and set to further improvements.

The beige drive bay was the first thing to go, followed by the 16cm x 4cm green LCD. The whole case was painted black, and the floppy was relocated to the side.

There are too many changes I made to list them all. The

5in LCD was the last major improvement. The whole project took eight months, due to difficulties in obtaining some parts. BlackMagic V2 is much better looking than the first version as well as more functional.

Thanks to Jim from Realtime systems for sending me the LCD, Frank from Maxwell Computers for providing some parts and loaning me the digital camera, and everyone who provided feedback. More pix: www.ausmodders.com

Tony's BLUBYU



TECHNICAL DETAILS

- MSI KT3 Ultra II mobo
- AMD Athlon XP 1800+ CPU
- 1,024MB DDR.
- Gainward GF4 64DDR.
- 40GB 7,200rpm Barracuda HDD
- 48x Lite-On CD-RW
- 16x LG DVD-ROM
- Volcano-9 HSF
- 350W ATX PSU
- Two 80mm blue LED fans
- 12in blue cold cathode fluorescent
- Steel braided round cables
- BLUBYU temps are 33°C idle and 36°C loaded

BLUBYU has had many mods. At first it started out as a plain mid tower case and I installed a side window with etched flames and an 80mm blue LED fan. I then installed a blow hole which also had an 80mm blue LED fan.

The interior has been clad with 0.08in polished aluminum, wire management, a 12in blue cold cathode fluorescent light (CCFL), four 80mm LED fans, and steel braided round cables.

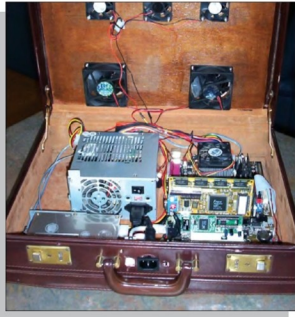
All of BLUBYU's grills are made from brass and are

mounted flush and screwless.

On the right side I installed a mirrored window showing a name and equipment list, the gold lettering changes to silver when CCFLs are on.

The front panel was made from black and mirrored acrylic. The power and reset buttons have been moved up 2in to fit the 80mm intake fan. And the stealthed drives are integrated with the front bezel.

EchO's Computer in a Briefcase



TECHNICAL DETAILS

- Celeron 866
- Gigabyte 6V-XC7
- 192MB 100MHz SDRAM
- 3.2GB hard drive
- Trident 4MB AGP graphics card
- 250W PSU
- Red LEDs for internal lighting
- Five cooling fans
- Briefcase

A friend and I were pondering the idea of a dedicated Half-life server for our LANs when I remembered I had an old briefcase lying around. . .

Rather than setting up a monitor and keyboard to use the computer we used the Remote Desktop feature of XP, this is why all the ports are obstructed – all that is needed is Network and Power.

In total the project cost less than \$50 as most of the

components we already had. The computer didn't need to be extremely powerful and we only need the graphics card to boot up. The Briefcase remains cool thanks to the fans on the outside – I'm not game to try an overclock. The network and power port sockets have been extended to the front of the case so that it is easy to plug in and set up.

A reasonably sturdy case, there were no real troubles constructing it once the component layout was planned.

Soviet's Red Box



TECHNICAL DETAILS

- AMD Athlon XP 2400+
- RADEON 9500 PRO
- EPoX 8KHA+
- 512 PC2100 RAM
- SB Live!
- 80GB & 20GB WD 7,200rpm hard drives
- Pioneer DVD reader
- Lite-On 48x/24x/48x burner
- Two cold cathodes
- Two blue LED Antec fans
- Two Thermaltake heat sensitive fans
- Vantec CPU fan
- Two Antec 60cm UV rounded cables

The hammer and sickle was supposed to be the main window to the motherboard but, as a fly started to hump my ear, away went the angle grinder to never-never land.

However, I created a smaller version at the top with a gold intake fan for the power supply. Both hard-drives have been reversed to help give a cleaner appearance on the inside.

There is a constant UV cathode and a red cathode that is wired into the sound card.

The other side is the star with Lenin's image which has constant blue laser and three red laser LEDs that are also connected to the sound card. During Battlefield 1942 at Valhalla this case can really light up.



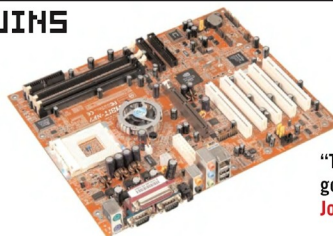
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John Gillooly



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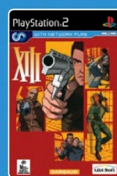
Hardware Online Arena



Gran Turismo 4



Destruction Derby Arenas



XIII



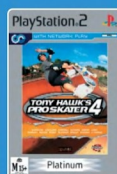
Medal of Honor Rising Sun



Syphon Filter The Omega Strain



Amplitude



Tony Hawk's Pro Skater 4



Fire Warrior



Midnight Club II

This is just the start of an awesome range of Network Entertainment titles on the way.

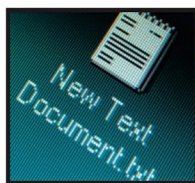
Games subject to availability. Check with your retailer for release dates.

This is what you need to get online:

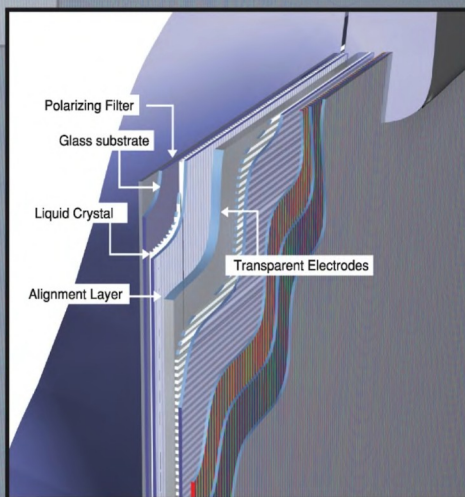
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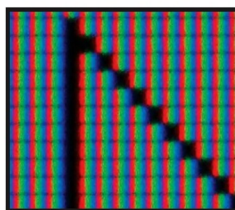




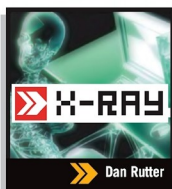
Viewing angle brightness
shift – in close-up!



LCD cutaway – The layers within the screen



Each pixel in an
LCD screen is
made up of
three skinny
rectangular
subpixels.



LCDs inside and out

You need an LCD. Yes you do. Well, if you're in the market for a new screen, or something that glows, then LCD is for you. Dan Rutter shows you exactly why you might want one, as well as how they work.

They're flat, they're thin, they're sexy. They're Liquid Crystal Display (LCD) screens, and people are now spending more dollars on them every year than they spend on Cathode Ray Tube (CRT) monitors.

The actual number of LCD monitors sold per year is still considerably lower than the number of CRTs, because LCDs cost more. But they're catching up fast.

The advantages of LCDs are obvious. Thin, dead flat, flicker-free, low power consumption. Some of the disadvantages used to be obvious, too – narrow viewing angles if you don't want your image to look like the LSD scene from *Easy Rider*, outrageous prices, and a nasty blur on fast-moving video, like movie playback and games.

LCDs now have wider viewing angles, lower prices and faster response, though. So even penny-pinchers will soon be able to justify buying one.

How they work

An LCD panel is a 'transmissive' device; it emits no light of its own. To view any kind of LCD, you either need a reflective layer behind it (as seen in most cheap LCD devices – watches, calculators, every Game Boy before the GBA SP), or a backlight that shines light through it. All PC LCD monitors use a backlight.

The light they use is a slim Cold Cathode Fluorescent Lamp – the same as the decorative CCFLs used to dress up case mods, but with a multi-phosphor white coating. The CCF is partnered with a diffusion panel that turns its output into an even rectangle.

In front of the diffuser, there's at least a five-layer sandwich.

First, there's a polariser sheet, which only passes light that's polarised in one direction. For the sake of this explanation, let's say horizontally.

Next, there's two layers of glass, with the liquid crystals and their switching mechanism sandwiched in between.

On top of that, at the front of the screen, there's another polariser sheet. It's arranged at right angles to the first polariser. Since the front polariser will only

WIN!

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Enter the super-fine land of the LCD with BenQ's FP591 – a high-quality, 15in, 16ms response time TFT, worth \$799, that blows away anything else in its class. With the help of BenQ (www.benq.com.au), we have two to give away, and all you need do is email the answer to the question below to win@atomicmpc.com.au (use 'BenQ comp' as the subject for the email). The winner will be announced in *issue 36*.

Q: Do LCD panels emit their own light?

pass vertically polarised light, no light can get through the whole panel, unless something changes the light's polarisation in the middle of the sandwich.

That something is, of course, the liquid crystal layer.

Liquid crystals are an odd state of matter halfway between solid and liquid. Their molecules don't freely swirl around, like a liquid, but it doesn't take much to make them change their orientation. Particular kinds of liquid crystals can polarise light when oriented correctly, and they change their polarisation behaviour when you pass a small current through them. It's this quality that makes LCDs work.

Left to their own devices, the liquid crystals in between the glass sheets 'twist' the polarisation of the light going through them. In this case, they'd change it from horizontal to vertical. The newly vertically polarised light can pass through the front polariser with no trouble.

When a particular splotch of liquid crystal is 'turned on' by its switching mechanism, though, its crystalline structure untwists. Now, it no longer changes the polarisation of the light passing through it. This means the light is unable to make it through the front polariser, and that part of the screen appears dark.

This design explains why you can reverse the polarity of a simple LCD. If you remove the small black-on-white LCD display from a calculator, for instance, and flip the frontmost component of it over, it'll now be white-on-black. ▷



More sophisticated control hardware can turn the crystals on partially, so they twist the light's polarisation towards the vertical, but not all the way there. The closer the polarisation is to vertical, the more of the light will get through. Presto – brightness control.

If all you want is a greyscale screen, then an array of switched liquid crystal squares will give it to you. If you want colour, you have to break up each pixel into three 'subpixels', and give each one a coloured filter – red, green and blue subpixels for each pixel. Then, by switching the subpixels appropriately, you can mix up any colour you like.

The switching mechanism originally used for LCD screens, and still used for simple LCDs in calculators and the like, is a grid of column and row wires made from transparent conductive material, with columns on one side of the liquid crystals and rows on the other. Connect one column to a voltage and one row to ground, and you turn on the corresponding pixel on the screen.

This 'passive matrix' switching, however, makes it impossible to rapidly refresh a whole screen. Passive matrix screens are cheap to make, but have such slow response that they're now practically nonexistent in the LCD monitor market.

'Active matrix' switching gives each and every screen subpixel its own little see-through Thin Film Transistor (TFT) switch. This makes the screen a lot more difficult to make, but the TFT switches can operate much faster

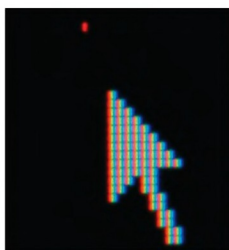
than a passive matrix system. TFT technology is now so ubiquitous that many people refer to LCD monitors as TFTs.

Problems

» Viewing angle

This is the most obvious problem LCD screens used to have. Look up at the screen and things are too dark, look down at the screen and things will appear too light.

Today, the best LCDs still can't quite match CRTs for colour fidelity as your viewing angle changes (your viewing angle does change even if you don't move – if your eyes are lined up with the middle of the screen, then you're looking down to see the bottom half of it, and up to see the top half), but they're close enough as makes no difference for



ABOVE: A stuck red subpixel against a black background.

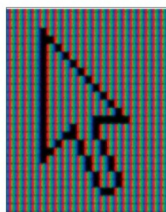
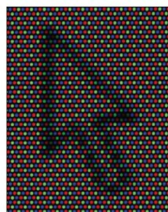


ABOVE: The same defect, against an aquamarine Windows desktop.

most users. It's only people for whom totally accurate colour and tone calibration is important – designers and publishers, for instance – that still can't tolerate LCD viewing angles.

» Pixel defects

Quality control is difficult, when you're making a monitor with three tiny see-through transistors for every pixel. A mere 1,024 x 768 TFT LCD needs 2,359,296



LEFT: LCD screens have hard pixels; CRT screens (FAR LEFT) don't. In extreme close-up, the sharpness difference is as clear as dots.

transistors, 1,600 x 1200 – 5,760,000 transistors. Every transistor is a roll of the dice, and even a one in a million problem rate is too high.

If a defective transistor means a subpixel can't turn off properly, it'll be permanently dark. This isn't too noticeable. If a subpixel can't turn on properly, though, it'll be permanently bright – and usually stuck at *maximum* brightness, as red, or blue, or green as it can be. That'll stand out very noticeably against a dark background.

A few years ago, practically every TFT monitor had at least one subpixel defect, and you needed to be good friends with your computer retailer if you wanted to be sure of getting a perfect one.

Today, the problem's not nearly as bad. A randomly chosen big-brand LCD monitor is now quite likely to be defect-free, and if you complain loudly enough to the manufacturer and/or retailer, you'll often be able to get a replacement for a screen that does turn out to have a defect. But it'd still be nice if you didn't have to worry about defects at all.

» Resolution

LCD screens have a fixed number of hardware pixels, instead of the arbitrary phosphor array of a CRT.

On the plus side, this means that LCD screens running at their 'native' resolution give a razor sharp image, which most users prefer to the inevitably fuzzy edges of CRTs. The downside, though, is that LCD screens can't do a good job of displaying resolutions higher than their native pixel count. Most of them don't even try. LCDs also can't sharply display resolutions lower than their pixel count, unless they put a black border around the image.

Modern LCDs have smart scaling hardware that smoothly maps lower resolutions onto the whole screen, but they still lose all of their lovely sharpness when they're doing it.

» Contrast ratio

Contrast ratio is the ratio between the brightest white and the darkest black a screen can display.

In physics-experiment-land, polarisers are perfect, and liquid crystals twist polarisation perfectly, so when an LCD has got all of its subpixels turned on, no light from the backlight can get out at all.

In the real world, every LCD always lets through some light from its backlight, no matter how hard it tries to stop it.



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What about plasma?

Today, if you want a big flat panel TV, you want a plasma screen. 30in and larger LCD screens exist, but they cost easily twice as much as plasma screens, which already aren't cheap.

Plasma screens are, essentially, a big array of tiny colour-filtered 'neon' lights, arranged in RGB subpixel sets just like an LCD. They're heavier and more fragile than LCD screens, but they're still far more manageable than giant CRTs and rear-projection TVs.

Cheaper plasma screens ('cheaper', here means 'less than \$10,000') may be big, but they don't have much better resolution than a far less expensive CRT. This is partly because TVs are viewed from far enough away that super-resolution is often likely to be wasted, and it's partly because plasma subpixels can't be made as small as LCD ones.

Cheap medium sized LCD televisions, by the way (this time, 'cheap' means \$1,900 for a 20in screen) are also low resolution. They generally only have a 640 x 480 pixel panel.



These days, contrast ratios of 500:1 (meaning white is 500 times the brightness of black) are common enough. There's no standardised way to measure contrast ratio, but any screen with a vaguely honest 500:1 or better ratio is still going to look good in a normally lit room. But no LCD's contrast ratio can beat a properly set up CRT, whose blacks will be pretty much exactly as dark as the unilluminated screen.

» Response time

This is the biggie for people who want to use an LCD monitor for games, or movie viewing.

Many, but not all, LCD monitors have a response time figure on their spec sheet. It'll be in milliseconds (ms), and it tells you how long the screen's subpixels take to go from off to on and then back to off again.

You'd think that it'd take longer to get from off to on than it'd take to get from quarter-on to half-on, but you'd be wrong. The smaller the brightness change, the *longer* it takes. LCD manufacturers are compensating for this with smarter driving hardware, that asks for a new brightness level beyond what's actually needed, then cuts the drive voltage to the actually desired level once the subpixel has raced to that point. But this only reduces the problem; it doesn't solve it.

The smaller a brightness change is, the less it matters if it takes a long time to happen. If a subpixel only has to change brightness by 1 percent, you won't even notice the difference. But there's a range of medium brightness changes where slow response becomes very obvious.

On an LCD screen with a reasonably snappy 30ms response time, moving a black and white mouse cursor around on a white screen may look fine. That's because

all of the intensity changes are full off-to-on ones.

Wave the pointer around on a 50 percent grey screen and it'll blur, though. Similarly, many 3D and other game scenes (dimly lit dungeon-y stuff, in particular. . .) will blur badly on a slow LCD.

If the most demanding thing you want to display on your LCD is DVD video (30 fps at most), then a screen with a 30ms response time will be fine. For games, look for 16ms.

» Refresh rate

Response times better than 16ms are possible, but won't help much. This is because LCD monitors have another problem. They don't have a refresh rate in the CRT sense, with a scanning electron beam painting the screen many times per second; no matter what input signal you feed an LCD, it won't flicker at all. But LCDs *do* accept a

'A few years ago, practically every TFT monitor had at least one subpixel defect and you had to be good friends with your computer retailer if you wanted to be sure of getting a perfect one.'

video signal with its own distinct frames-per-second rate. This input signal rate places the same limits on the frames per second the screen can actually display as it does for a CRT monitor.

If LCD monitors commonly accepted the same above-85Hz refresh rates as CRTs, then this wouldn't be a problem – or, at least, it'd be no more of a problem than it is with CRTs. Few LCDs can accept an input frame rate much above 75Hz, though, through either VGA or Digital Visual Interface (DVI).

The twitchiest of twitch gamers, therefore, will find they are out of luck.

You can turn off vertical sync and display horizontal slices of multiple rendered frames on one displayed frame with your LCD, just like with a CRT. But the lower signal rate places a lower cap on the amount of information the screen can deliver to your visual cortex.

The future

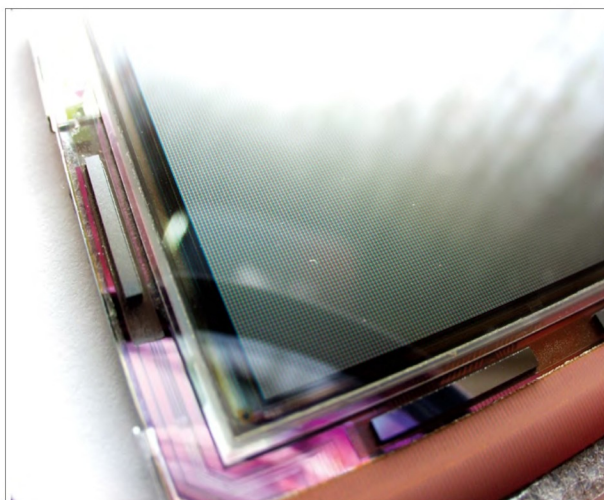
The CRT is going to die, but so is the LCD. The stacked-polariser, separate-backlight design works surprisingly well, but it'd obviously be better if the subpixels could glow all by themselves.

That's exactly what they do, in Organic Light Emitting Diode (OLED) displays.

Normal LEDs can't be made small enough to be useful as subpixels on high-res screens much smaller than a tennis court, but it turns out that LEDs made from certain organic compounds can. OLED screens need no backlight, they're bright, their contrast ratio is as good as a CRT's, and they've got no viewing angle limitations.

There are two pro-OLED schools of thought at the moment. One says that the lifespan problem is going to be fixed, and we'll soon be using long-life OLEDs for all our display needs.

The other says that OLEDs will continue to die young, but will become so cheap that nobody will care. Nobody in either camp has much idea when OLED monitors will be on the retail shelves, but it's generally agreed that they won't turn up for at least a few years.



The bare panel assembly from a Game Boy Advance.

OLED screens can also be built up out of smaller sub-display 'tiles', which is good news in the war against screen defects.

Unfortunately, OLEDs aren't quite ready for prime time yet, because their lifespan stinks. A few thousand hours, at best; maybe only one thousand.

That's fine for a mobile phone or digital camera whose display is only on for a few minutes a day. But it's no good for a computer monitor that may be on for more than eight hours a day. At eight hours a day, five days a week, a 2,000 hour OLED panel won't even last for a year.

Different OLED colours age at different rates, too, so an elderly OLED screen won't just be dim – it'll have funny colour cast problems as well.

What to buy?

Only three years ago, 15in LCD monitors were as expensive as 21in CRTs.

That wasn't actually *quite* as bad as it sounded, because CRT monitor sizes are always padded by about an inch, and LCD sizes aren't. If they're the same shape, a 15in CRT has about the same viewable area as a 14in LCD.

But back in the year 2000, you still had to be pretty turned on by the advantages of LCDs to put up with paying the same money for only a bit more than half as much screen area as a CRT.

Today, CRT prices have fallen a little, but LCD prices have fallen a lot – and LCD viewing angles, contrast ratios and response times have all improved markedly.

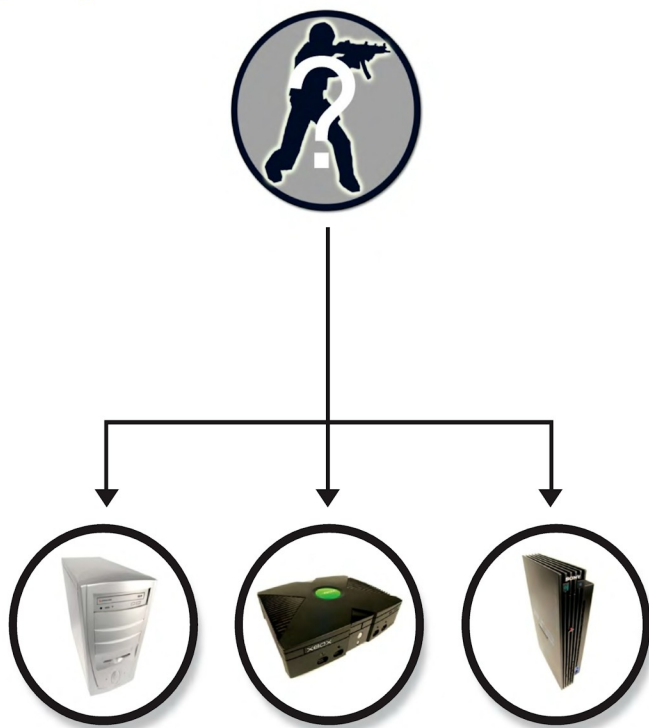
Quality 1,280 x 1,024 pixel 17in LCD screens can now be had for around \$700, which is less than twice the price of a decent 19in CRT.

These two kinds of screen sizes are quite close in viewable area, because 1,280 x 1,024 LCDs have a 5:4 aspect ratio – closer to square than the 4:3 aspect ratio of most computer screens.

Most users don't really *need* a light, thin, low power monitor, so this price difference is still big enough that a CRT is the sensible choice. Give it another year or two, though, and LCDs will genuinely be better value for almost everyone.

If you're an Atomically hard core gamer, you'll want to wait until someone makes an LCD that accepts 100Hz or higher input.

If you're willing to trade a smidgin of frame rate for a much lower chance of herniation on the way to the LAN party, though... well, in that case, you're probably already using an LCD, aren't you?



Spate of Play



Multiplayer gaming takes a step forward and John Gillooly lines the PC, Xbox Live and PS2 up against each other.

It has only been over the past year that the notion of serious online gaming has been anything other than a PC thing. Now we have two of the major consoles moving their multiplayer online via broadband and taking online gaming to the masses. The PC has always revolved around a handful of popular titles, so it is a perfect time to take a look at how online gaming works and whether the console newcomers have what it takes to break through to mass market popularity and, more importantly, what experience they offer.

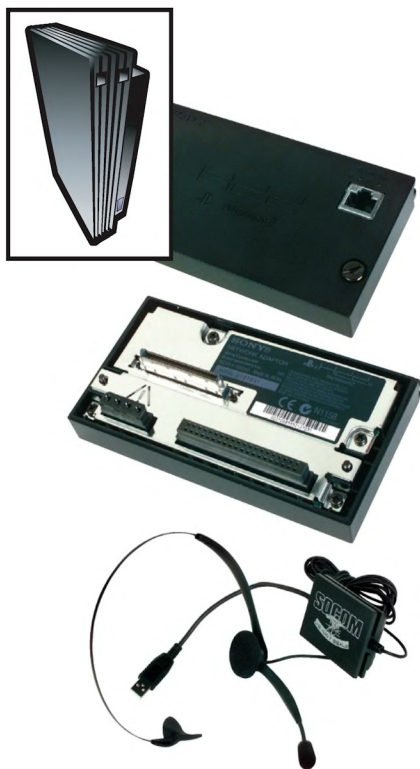
Get ready for the killing

A couple of years ago multiplayer was king when it came to PC game development. Heaven help any poor game developer who focused on, gasp, the single player experience. Even the crappiest of first person shooters usually had a list of multiplayer modes longer than Dr Derek Smart PhD's enemies list. Out of this intense focus came games like Quake 3: Arena and Unreal Tournament, both of which

developed a strong multiplayer following, but dozens more were doomed to fail in their attempts to grab even a small dedicated following on the PC.

This should not have been surprising to anyone as the online PC gaming scene had always been somewhat of a monoculture. Shooter fans historically gravitated to Quake, either in vanilla deathmatch form or the team based Team Fortress mod; realtime strategists got all hot and sweaty over Blizzard's Starcraft; role players flirted with Ultima Online then jumped into Everquest. Diversity in online gaming usually ended up being restricted to areas like Microsoft's gaming zone, or similar portals.

Over time titles changed but the trend has stayed the same. Starcraft is still the most widely played RTS; Everquest has had few serious challengers in the MMORPG arena and Quake Team Fortress was usurped by the Counter-Strike mod for Half-life as the game that simply swamped all the other shooters in the race for online popularity.



ABOVE: The PlayStation 2's network adaptor plugs into the back of the console and features an integrated IDE controller for the upcoming PS2 hard drive. Voice communication is an option and plays a big part of SOCOM through this Logitech headset.

The rise of Counter-Strike has been a revelation for online multiplayer gaming, but it is also symptomatic of the problems inherent in the traditional model used for the server/client based online gaming.

Games like Quake, Unreal Tournament and Half-life rely on ISPs setting up servers for gamers to connect to. The problem with it is that in order for an ISP to outlay the bandwidth and hardware costs required for such an effort, it has to ensure that it will actually get value for money, which translates to more customers. This has been an endemic problem with most online PC gaming for some time now (the MMORPG genre is the exception because publishers actually run the servers), and there is little end in sight.

It takes a monumental effort for a game to become entrenched in the online PC scene. Most people don't realise that even a game as ubiquitous as Counter-Strike started out with only one Aussie server location – GGL. As the beta versions of Counter-Strike progressed, more and more gamers started becoming aware of its existence and started playing, server numbers started to grow and the juggernaut began to roll. It was also helped by id software releasing the source code to Quakeworld, the program

required for the online multiplayer team fortress mod to run on Quake. This brought with it a huge jump in cheating and a large chunk of team fortress players ended up migrating to Counter-Strike, which was then cheat free.

Counter-Strike is the most widely played example, but similar trends have been seen in most PC gaming genres. Since Counter-Strike established itself several other games have gotten a small foothold in the scene, but even the most popular titles like Unreal Tournament 2003, Tribes 2, Battlefield 1942 and mods like Desert Combat and Day Of Defeat have had nowhere near the number of players as Counter-Strike.

If we look at massively multiplayer online gaming, the potential for a monoculture is even worse. This type of gaming involves the dedication of serious hours to character development, and the nature of the persistent worlds seen means that it is simply unfeasible for someone with any sort of life to play more than one of these titles concurrently.

From a development point of view this can end up becoming a self-feedback loop. Because content can be added regularly, developers can keep the experience fresh and new, which reduces the natural flow of gamers to other titles once they get bored.

This has meant that Everquest has risen to the top of the MMORPG pack and seems set to stay there for the foreseeable future.

Online consolation

Online gaming has always been seen as a PC centric activity. Sega was the first to look toward online gaming with the integration of a 56K modem into the Dreamcast console, but it had little success due to only a handful of titles actually including online features, the general crappiness of the TV for the supported web browsing and email functions, and the slow experience delivered by dial-up modems.

Sega eventually released a broadband adaptor, but apart from mid range success of Phantasy Star Online in Japan, the broadband adaptor only became useful once people started hacking the console, and even then it was for uses other than gaming. One of the most intriguing uses of the Dreamcast was as a box that hackers could physically take into a location, hide in an out-of-the-way place, hook into the network, leave and then use as a backdoor for external network access. By that stage the Dreamcast and adaptor could be found on ebay for such a low cost that it was perfectly viable as such a disposable hacking tool.

However we now have two online console gaming platforms, using different models of online gaming, but both leveraging the increasing prevalence of broadband to make for a better gaming experience. The Xbox does this thanks to its inbuilt Ethernet adaptor and Sony has recently released a network adaptor for the PlayStation 2 to enable online play.

PS2 Online

The PlayStation 2 launched with the usual console multiplayer functions, with four player action available on some titles through the use of a multitap controller adaptor (A handful of games even supported IEEE1394 networks to hook multiple PS2s together) however it has now gone online thanks to a separate Ethernet adaptor that screws onto the back of the PS2.

There are two reasons that cynics will cite for Sony's release of this adaptor. The first is that it is a reaction to the ground-up focus that the Xbox has on online gaming, >

What's so special about the words 'race car' and 'navy van'? They're palindromes, which means they read the same backwards or forwards. Just like 'alibolophobia', the fictional term used to describe a fear of palindromes.

the second is that it is a way of preparing for the next generation CELL architecture that is being developed for the PlayStation 3. At the simplest level, CELL can leverage other connected processors to expand the computing capability of the PlayStation 3 or in fact any other Consumer Electronics device that uses the CELL architecture. For this to work, it needs broadband, and it needs broadband done right.

Conspiracy theories aside, Sony's online gaming with the Playstation 2 is more in line with the PC than the Xbox. It uses a server/client approach without the closed network that Xbox Live has.

As an example, let's look at the current online flagship title for the PS2, SOCOM. Bearing more than a passing resemblance to Counter-Strike, SOCOM is a team based tactical first person shooter. To get online with the game you go through a PC-like server browser and jump into a game. Any PC gamer will then know the drill. Join a team, kit yourself out and then play a series of rounds. If you die, you wait it out until the next round.

Unfortunately thanks to hardware like Datel's Action Replay add-on, which allows you to find and enter cheat codes into PS2 games, PC gamers will also be familiar with the cheating experienced in games like SOCOM. It is truly unfortunate that even before the service launches in Australia, PS2 online seems poised to suffer the same indignities that almost destroyed some online PC games.

As with the PS2 itself, Sony's major advantage is that it has titles that people will purchase hardware just to play. We have a sneaking suspicion that while there have been moderate overseas hits, it will not be until huge titles like Grand Turismo 4 are released that PS2 Online really takes off. However, just like the PC there is a real danger Sony's Online strategy will end up creating the same sort of monoculture that is experienced in the PC sphere as gamers gravitate to a handful of titles and network support for the rest just isn't financially viable for providers.



Xbox Live

After the failure of the Dreamcast's inbuilt 56K modem to move console gamers online, Microsoft knew that it needed to get the experience right if it was to take the Xbox online. This involved a twofold approach; the inclusion of a 10/100 Ethernet port on the console itself for broadband only multiplayer and the adoption of an online gaming model different from the PC.

There are, after all, fundamental differences between how people use consoles and PCs. Consoles are social things, sitting in



↑ ABOVE: Unlike the PS2, Xbox live has integrated voice communication as part of the live service. The live starter kit features this Communicator headset, which plugs into the controller for hours of trash talking fun.

the living room, plugged into the TV. Multiplayer gaming is almost solely confined to multiple players all plugged into the same box and screen, often in that damn annoying split screen mode that drops the player's view of the action to a point where it is annoyingly tiny on anything other than a projector.

The key to Xbox Live is to take the couch-based gaming experience and extend it by adding the ability to play against someone on a couch somewhere else on the globe. In fact, one of the major benefits of Xbox Live is that it gives you your entire screen back.

This philosophy generally precludes the server/client mode used for gaming on the PC and PS2. Xbox live extends the experience by making online play into just another multiplayer mode for the end user. Sure, you need to have an account set up (Once a Live Kit is installed it is linked to the MAC of that Xbox for life), but once that happens you can jump in and play against others as easily as you could play against a person sitting right next to you on the couch.

In the end this means that there will be a wider spread of games played over Live. There will always be gravitation towards certain titles like the enormously popular Moto GP series, but it means that gamers can fire up any multiplayer game without first crossing their fingers that some altruistic ISP has taken a gamble on creating an online server for it.

Live also has other benefits for anyone who has suffered the fun-destroying experience of online cheating. By running an enclosed network rather than an open server/client architecture, Xbox Live avoids the third party hacks that pave the way for

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cheating on the Net. This is the main reason why modded Xboxes cannot be connected to Live, as a modded console would easily open the network up to cheating (of course that is not the only reason that Microsoft frowns upon people trying to connect modded Xboxes *cough*Linux*cough* but stopping cheating is imperative for long term viability as an online platform).

The combination of Live and the hard drive built into the Xbox also makes Live more than just a gaming service. Just like Valve Software's Steam client for the PC, Live allows for new game content and even patches to be downloaded for supported games. In fact, Unreal Championship on Xbox has the dubious honour of being the first console game to be patched thanks to Live.

It is hard to declare one method of online gaming the best and there are obvious strengths to all the platforms.

Even though the PC encourages the development of a multiplayer monoculture, it is perhaps one of the last bastions of democracy as for a game to rise to popularity it needs support. This quickly weeds out second-rate multiplayer titles, but it occasionally means that less hyped games get overlooked by the masses.

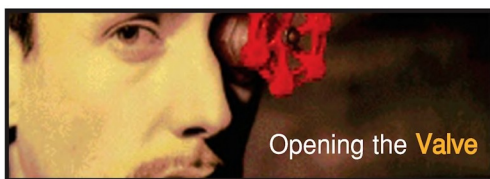
The Playstation 2 seems to be on a similar path to the PC, but again it will be the cream of the crop that end up as the popular online titles. The big issue for the PS2 is the ease at which cheating can occur, and unlike the PC or Xbox, the lack of a hard drive in the PS2 means that

patching such problems will be nigh-on impossible.

Sony does plan to release a hard drive to work with the network adaptor, bringing functionality up to the level of the Xbox. However, similar approaches by console makers in the past (Sega's Mega CD anyone?) have shown that without the fundamental console advantage of all client hardware being the same, developers tend to be reticent to support add-on technology.

Xbox Live is refreshing in its approach to online gaming, however the service comes with a regular monthly fee involved after the initial period of time supplied with the Live Kit. Again we can expect the big titles to keep people hooked on Xbox Live and the model is such that there should be a much wider range of actively played games than the other platforms. But we should expect this from the one console on the market designed for online play.

Sony will eliminate the piecemeal approach to online console gaming with the PlayStation 3, but by then it may well have to cope with Xbox being the online gaming incumbent. PC online gaming will never go away, but the consoles have a much better chance of sucking the less fervent gamers into online multiplayer. Thankfully with products like Xbox live we are finally seeing ways out of the tendency towards single title environments that have been both a blessing and a curse for online games for the past few years.



Counter-Strike almost became a victim of its own success as increases in cheating drove gamers to the point of online frustration. Numerous third party solutions like Punkbuster and Cheating Death were developed to combat the rise in online cheating, but it became obvious that without the involvement of Valve software in the effort, it would all be in vain. So word started trickling out that Valve was looking into a method of being able to distribute small anti-cheating patches on a daily or even hourly basis, patching holes as they occurred. This anti-cheating effort soon turned out to be part of a larger program called Steam, which also incorporated features like a server browser, instant messaging client and file distribution system.

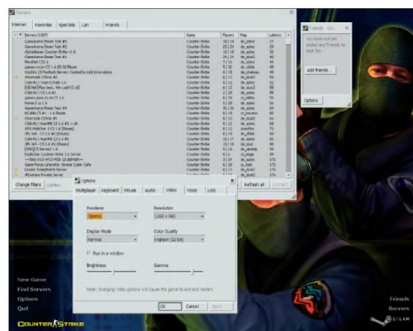
Steam was in beta form for almost two years until it went live in mid September as part of the ramp up to the release of Half-life 2. In those two years it became apparent that Steam was part of something much bigger from Valve Software (always remember that Gabe Newell was project manager for early versions of windows at Microsoft).

Steam has all the functions originally promised, but it also adds some significant features. First and foremost it is a way for Valve to become a software publisher and distributor via broadband. Half-life 2 will be available for purchase via Steam, or gamers can pay a monthly subscription fee to Valve, which will give access to all of its products for as long as the fee is paid. Of course, Half-life 2 will still be available in shops like any other game, but Steam will allow gamers to download Half-life 2 straight to their machine, and then take their account anywhere.

In fact, Steam is now compulsory for anyone who wants to play Half-life or any of its mods online (this is free for those who already own Half-life), having replaced the long-lived WON authentication system that Half-life used.

But perhaps the real reason for Steam is the LAN café phenomena. LAN cafes have always operated in somewhat of a grey area for licensing, but with Steam becoming a requirement for online play, Valve can now account for every copy of Half-life and more importantly Half-life 2 installed and ensure that it receives the necessary revenue. This is a bold move, and it will be an experiment that a lot in the industry will watch closely to see if it impacts the popularity of Valve's online offerings or not. If it doesn't expect to see other publishers either joining Steam or coming up with their own similar technology to make sure they are not losing out on gaming café revenue.

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Computex 2003



John Gillooly dives headfirst into one of the worlds biggest computer shows to see what the next year has in store for the geeks of the world.

Taipei is one crazy city at the best of times, but when it comes time for the annual Computex trade show it goes somewhat insane. Computex is the world's third largest computer show, smeared across three exhibition halls, numerous hotel suites and a ridiculous number of meeting rooms located in nearby buildings. All in all the show takes up several city blocks in every direction around Taipei's new centrepiece, and the worlds tallest building, the soon-to-be-completed 101 tower (which is a beautiful example of how far the country has come in a relatively short amount of time, apart from the fact that it looks like the world's biggest stack of instant noodle boxes).

The entire industry turns out for Computex, with the big companies like NVIDIA, ATI, AMD and Intel all making their presence felt amongst Taiwan's biggest and smallest tech companies. For this year's event NVIDIA laced all the halls with Taiwanese booth babe versions of its Dawn and Dusk demo characters, ATI adorned dozens of busses with

RADEON logos and AMD went the slightly kooky route of having groups of four or five guys in Athlon 64 shirts walking around and stopping occasionally to unfold a banner and yell 'Athlon 64' in unison.

But when you take away the PR gloss, Computex is all about products. We have seen so many new and different products it's hard to cover everything, but there have been some standout offerings that range from the seriously functional to the seriously weird. There were, of course, distinct trends to be seen.

As we expected, nearly every mobo manufacturer has decided to launch their own series of mini-barebones PCs, as well as a pile of Athlon 64 motherboards. But unfortunately those companies that had next generation ATI and NVIDIA video cards kept them under wraps as neither company was prepared to announce the products until after the show finished.

NVIDIA's GeForce FX 5950 card was in fact shown publicly, even though it was not actually named, by CEO Jen-

Sen Huang and Marketing VP Dan Vivoli during NVIDIA's uncharacteristically GPU-free press presentation extravaganza. Instead of GPUs, NVIDIA chose Computex to outline a vision of the new markets it is moving into. It announced the GoForce series of video chips for mobile phones while also talking up the nForce3 chipset for Athlon 64 and publicly unveiling its Forceware suite of software that moves away from just unified drivers to an ever-growing suite of applications designed for NVIDIA chipsets of all kinds, from PVR timeshifting TV software to new RAID utilities.

To satisfy the eye candy freaks, it did show off some games like S.T.A.L.K.E.R. (which is looking stunning), but the focus was definitely on the concept of the digital home that is being pushed by companies like Microsoft with its Media Center edition of Windows and Intel with its home networking obsession.

In contrast ATI was definitely focused on video cards and its long delayed RADEON 9100 IGP chipset for the Pentium 4. It was talking extensively about the new RADEON 9800XT high end card, and the mid range RADEON 9600XT – which both replace the PRO series cards as the top performers in ATI's range – and severely hyping the fact that all of its DirectX 9.0 cards will ship with the full version of Half-life 2.

The RADEON 9600XT, previously codenamed RV360, sports a 500MHz core that is aided by the use of Low-K dielectrics and a thermocouple in the silicon and 600MHz, 128-bit DDR memory and will retail for US\$199.

At the top end, the RADEON 9800XT comes clocked at 412MHz with 730MHz 256-bit DDR1 memory. It comes on a redesigned board and has thermal monitoring via a discrete thermocouple place near the chip. Of course, this comes at a price, namely a whopping US\$499.

Besides the two big players, both VIA/S3 and the newly formed XGI were showing off new DirectX 9.0 graphics chips. VIA's Deltachrome is a mid range card designed for decent gaming performance but with a wider feature set focused upon image quality.

XGI, which is a new company formed from the Xabre team at SiS and the graphics team from Trident, was showing its Volari series. At the moment, the mobile Volari XP4 is a renamed version of Trident's XP4 graphics chip, and the desktop Volari is what has become of the Xabre 2 chip that SiS was developing. This will change next year as the two architectural approaches merge for the first true XGI developed product.

While Intel's presence was somewhat low

key thanks to Computex coming directly after its Silicon Valley geek love-in, the Intel Developers Forum, AMD chose the week of Computex to finally unveil the Athlon 64 to the world.

In a launch event in the New York New York shopping centre, AMD dragged out top executives from VIA, SiS, NVIDIA and ULI to show the world that the chipset industry was behind the Athlon 64 and Athlon 64 FX CPUs. While AMD hyped the bejesus out of the enthusiast focused Athlon 64 FX, the general consensus among the numerous motherboard manufacturers we talked with was that the high price and small volumes of the Athlon 64 FX meant that it just wasn't viable to make consumer motherboards for the Socket 940 design, so it looks like Athlon 64 FX owners will have to go for Opteron workstation boards for the foreseeable future.

Most manufacturers were proudly displaying their Socket 754 board offerings for the vanilla Athlon 64 chip, and the side effect of AMD's constant delays has been that these should be some of the most stable and tweaked up chipsets ever released. VIA in particular have had the chipset ready and raring to go for a year now, so the intervening time has been spent tweaking it up to maximum performance. Most mobo makers will be offering both NVIDIA and VIA based boards for the Athlon 64, however SiS still only has a handful of manufacturers releasing boards based on its chipset.

The products

Trying to cover all the products on show would be impossible, but there were many products that stood out for a variety of reasons, from the zany to the seriously cool.

Among the sea of mini-barebones systems were many similar products, with a few standouts. ABIT's new DigiDice system is a beautiful compromise between size and performance. It's one of the larger systems, but it is a lot more like a normal PC than most of them. It can happily accommodate a two-slot GeForce FX series card, and can pack a lot more hardware in than most, but perhaps the most impressive thing is that the DigiDice is a box designed for overclocking, with a large dial on the front that can be used to overclock the system inside, and enough temperature monitoring gear to make it reliable. Possibly the most revolutionary part of DigiDice is the essential oil burner attached to the back of the unit, which uses the heat from the heatpipe cooler on the CPU to make your overclocking experience smell better than ever before. ▸



▲ ABOVE: AMD's presence may have been low key despite the Athlon 64 launch, but at least a few people were excited; **MIDDLE:** Gainward is following the lead of Sapphire with its passively cooled RADEON cards by building this passively cooled GeForce FX 5600 card; **BOTTOM:** Shuttle manages to make its XPC even smaller with the externally powered RADEON 9100 IGP based ST62K.

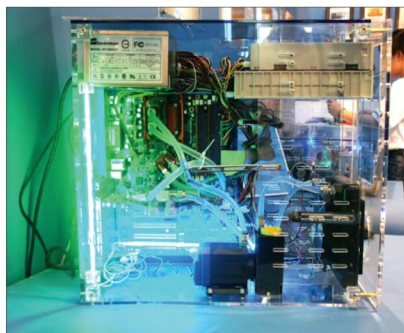
Apparently, the reason we're mostly right-handed is because a creature with one leg and a primitive ear in its anus fell on its (right) side and preferred it that way. Arse-phonic or what?



↑ ABOVE: Gigabyte's blood pressure cuff was one of the odder offerings at the show; **MIDDLE:** XGI's Volari 8 Dual card is targeted at the high end and will have a price to match; **RIGHT:** NVIDIA may not have announced its new mid range card yet, but CoolerMaster was showing the new heatsink that it built for the card.



On the smaller end of the mini-barebones spectrum, Shuttle was showing off a range of different XPC designs. The



one that's most intriguing is the upcoming RADEON 9100 IGP based ST62K, which is noticeably smaller than the standard XPC models, while still retaining room for a CD-ROM, hard drive and floppy. This is achieved

↑ ABOVE: Gainward has teamed up with German watercoolers Innovatek for its watercooled GeForce FX 5900 card.

through some stunning motherboard design work, which has eliminated the need for an internal power supply. The ST62K uses an external power supply unit, which connects to the back of the XPC. Power is then routed through the motherboard itself for the drives. This helps it to be both silent and tiny, and this will be Shuttle's Media Center system, thanks to its silence and size. It also has a CMOS reset button on the rear to avoid the hassle of having to open the XPC if you tweak it into non-working oblivion.

In a sea of similar GeForce FX cards Gainward's offerings stood out thanks to some nifty cooling work. Following the lead of Sapphire's passively cooled RADEON series,

Gainward has developed a heatpipe system for its GeForce FX 5600 card so NVIDIA fans can also experience the joy of silent video cardage. For the high end GeForce FX 5900 card, Gainward has teamed with German watercooling experts Innovatek to put together a complete system watercooling kit, with blocks for the CPU and chipset as well as a watercooled GeForce FX 5900.

On the ATI side, Gigabyte was showing a new cooler for its RADEON 9600 PRO, which allows the chip to run at 500MHz rather than the usual 400MHz. The cooler uses a copper heatpipe to shunt the heat away from the core. On the quirky side, Gigabyte was also showing off its new blood pressure monitor that attaches to a USB header on their motherboards. Simply place the cuff on your left wrist, click a button and wait while the cuff inflates, and see just how unhealthy you really are. It isn't exactly a mass market appeal product, but it is damn cool anyway. Gigabyte also had a GeForce FX card on show, and displayed GF FX boxes at the NVIDIA launch event, but it will be a few months before we find out if Gigabyte will be the first big company in years to deliver cards based on both leading manufacturers' graphics chipsets.

Finally, the prize for most audacious product goes to a Friendtech and its Xbox 2. Essentially a pre-modded Xbox with a 1.4GHz Tualatin Celeron, bigger hard drive and fancy new case alterations. Of course, while the product looks cool it did beg the question of will they be able to sell it – their somewhat naive response was that it enhances the Xbox experience so Microsoft should be fine with it. In reality, all it does is make the games run at an almost unplayably fast speed.



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Nokia N-Gage



Dan Rutter pulls apart the latest game-enabled mobile phone from Nokia and finds that, although it may feel like 'talking to a taco', it provides a big improvement on the humble Snake that's graced our mobiles for years.

People have been playing games on mobile phones for years now and today's full colour 'smartphones' can manage a lot more than another update of Snake.

They've got nothing on Nokia's N-Gage, though. It's the first true mobile phone/handheld game hybrid. It's a GSM phone with extra Symbian OS smartphone features, MP3 player with FM radio and, yes, 3D-capable handheld 'game deck', with Bluetooth multiplayer capability.

And it comes all in one 70 x 134 x 20mm package, weighing 137g with battery.



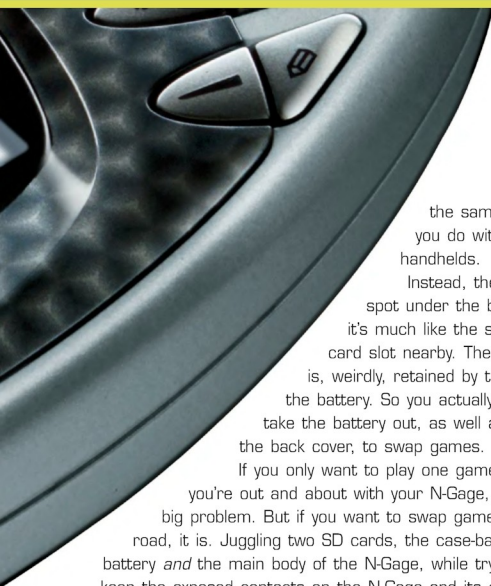
There's no camera, flashlight, laser pointer or fly fishing reel included. But you can't have everything.

The N-Gage has a normal mobile phone button count plus a few multimedia extras. For games, you use the D-pad to the left of the screen, and the 5 and 7 keys on the keypad do A and B button duty.

The N-Gage doesn't need a lot of plugs and sockets. There's just a USB connector, audio in and out (using tenth-inch micro-plugs, not standard eighth-inches), a DC input, and a hole for the speaker's sound to get out.

The back of the N-Gage comes off easily, which is good, because N-Gage gamers will be taking it off a lot. N-Gage 'cartridges' are MultiMediaCards (MMCs), which is fine, but the N-Gage doesn't have a 'cartridge slot' that lets you swap games





the same way as you do with other handhelds.

Instead, there's an SD spot under the back cover; it's much like the smaller SIM card slot nearby. The SD card is, weirdly, retained by the edge of the battery. So you actually have to take the battery out, as well as remove the back cover, to swap games.

If you only want to play one game while you're out and about with your N-Gage, this isn't a big problem. But if you want to swap games on the road, it is. Juggling two SD cards, the case-back, the battery *and* the main body of the N-Gage, while trying to keep the exposed contacts on the N-Gage and its cards clean and undamaged (better add an MMC case to the things you're shuffling. . .), is a heck of a lot more complex than just popping out a GBA card and slapping another one in.



Under the skin

The front panel is easy to remove, to allow you to 'skin' your N-Gage. A metal plate protects the circuit board from harm.

The button switches are high quality metal dome units, which have less travel but a more positive click than the rubber dome switches used in the GBA. The N-Gage doesn't have pressure sensitive buttons; neither does the GBA.

The little things in between the switches are the LEDs that backlight the keypad.

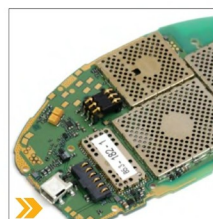
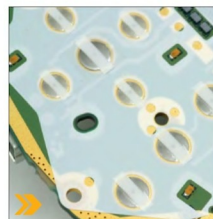
With the circuit board removed, you can see the adorable little ported enclosure for the speaker. The speaker, and all of the N-Gage's other connectors and widgets, connects to the circuit board with elegant no-plug spring terminals.

On the flip side of the circuit board, the chips are all covered by clip-on RF shields. They're essential for a device that wants to receive FM as well as work as a phone.

Pop off the shields and a substantial chipset's revealed.

The high chip count isn't surprising, when you consider how much the N-Gage can do. It has a full Series 60 Symbian OS feature set of comms and multimedia stuff, plus the game deck features, plus the radio.

The Philips TEA5767 is a single chip FM radio, the TI AIC23B (full name TLV320AIC23B) is a stereo audio CODEC with integrated headphone amp, the three AMD N643GT7M1 chips are 64-megabit CMOS flash memories, and the SEC 316 J61L K4M28163PD-marked chip is a Samsung 128-megabit DRAM, but the UPPWD2F 3A1N9J, 4370825 PK04U0301 and Hitachi 08125B 2M3 3MJ1763 chips, I couldn't find. The Hitachi one's obviously important :-).



The screen

The N-Gage screen has an unusual portrait layout, with 208 x 179 pixel resolution. It's backlit (like the GBA SP), it has a 4,096 colour palette (the GBA can display 511 colours at once from a 32,768 colour palette, but there's really very little difference for gadgets this small!), and it's driven by hardware capable of true 3D. One of the release games is a surprisingly faithful remake of the original Tomb Raider.

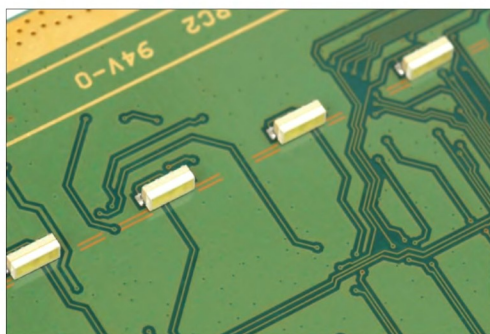
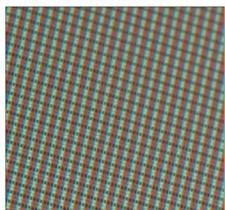
The screen is backlit by four white LEDs and a diffuser panel turns their output into an even glow. This is the same trick that Laptops do with the light from a white fluorescent tube.

As an ordinary hold-it-to-your head phone, the N-Gage is mildly ridiculous, because the only place Nokia could find to put the microphone and speaker was the top edge – where the shoulder buttons would live if it were a GBA. As a result, you have to hold it to your face edge-on.

Commentators have variously described this as looking like talking into a taco, conversing with a croissant, or having a Frisbee embedded in your head.

It shouldn't be a big problem, though, because the N-Gage comes with a stereo headset which doubles as a hands-free unit.

The N-Gage's biggest feature is Bluetooth multiplayer gaming, which is a great idea; you can play games on



the bus, on the train, at work, anywhere, with anyone reasonably close. Of course, if nobody reasonably close actually *has* an N-Gage, you're going to be out of luck.

Games can also transfer data over the phone system, which could be a very big feature if only some games come out that will support it, and if it doesn't end up costing a buck a minute.

Nokia have their work cut out for them with the N-Gage. Consoles, handheld or otherwise, need popularity, and the N-Gage will need more than a couple of multiplayer games to break the GBA's hold on the market.

The N-Gage's awkward game-changing system and tiny game library (only four games shown so far) count against it – and then there's the redundancy problem.

Nerds who can afford an N-Gage are likely to already have a phone. Maybe they'll swap their SIM card into the N-Gage after-hours.

Gaming gauging

We had an opportunity to fiddle with the gaming capabilities of Nokia's N-Gage to see exactly where it stands in terms of graphics and usability. In this case, the N-Gage has sacrificed some of its comfort as a mobile phone so as to provide the user with a reasonable grip for gaming. The position of the screen and the unit's flat shape make it hard to hold to the ear without planting a lovely thumbprint on the LCD.

Although Pandemonium wasn't the best game to test the N-Gage with, it did provide plenty of 3D and 2D elements to test the unit's mettle. As far as graphics go, they look decent and run satisfactorily, and the tiny screen is both a grace and curse; because it's so small, you can get away with less complex imagery, but you'll find yourself squinting reflexively to make certain details out.

Note that the N-Gage requires a SIM card in order to do anything – even play games. This isn't unexpected though, considering that it *is* a mobile phone.



N-Gage website: www.n-gage.com



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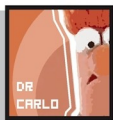
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Broadband technologies



The term 'broadband' covers a multiplicity of technological sins. This month Dr Carlo Kopp explores the depth and breath of broadband technologies – and takes a peek at some possible futures.

The bandwidth bottleneck

The sad reality of the early 21st century is ageing infrastructure in developed nations like Australia. While trains coming off railroads grabs the headlines, crumbling and corroded low speed telephone wiring to homes and business sites does not.

The only truly ubiquitous data connection we have in this country is the plain old telephone line (POTS) and the voiceband modem – and it presents a true 'bandwidth bottleneck'. While many voiceband modems achieve 115Kb/s on paper, this performance is contingent on the quality of the connection. With many lines to end users of dubious electrical quality, and often over larger distances than seen in the US and EU nations, the unfortunate reality is that most modem users have to be satisfied with 33Kb/s – like it or not.

This problem is often described as 'the last mile of connection bandwidth problem' – with optical fibres between telephone exchanges the bottleneck is well and truly in the last mile – or more often in Australia, three miles.

The robust long term fix to this problem is to run single mode optical fibre to every household. Given the investment costs involved, and shareholder expectations of short-term payback in the Telco industry, this is unlikely to happen any time soon.

Other lower performance and less elegant solutions have cropped up in recent years and become established in the market, with varying degrees of success, as many readers will know from experience.

Digital subscriber line technologies

The starting point for any discussion of DSL technologies is DSL/ISDN, or Integrated Services Digital Network. When initially conceived, ISDN was envisaged to be the digital replacement for the established POTS service. Every household was to have its analog service replaced with ISDN, which would provide a pair of 64Kb/s circuit switched synchronous channels (ie: the 2B in 2B+D) for telephone and data services, and a single 32 or 16Kb/s packet mode

channel (the D in 2B+D) for the purposes of link management and data services. The D-channel uses the LAP-D protocol which is closely related to the established X.25 LAP-B protocol (LAP-A having been a failure by design).

While ISDN struggled to receive customer acceptance, voiceband modems on POTS lines plugged the gap with line bit rates up to and beyond 28.8Kb/s. Fast voiceband modems competed directly against a single 64Kb/s ISDN B channel. The attraction of a more expensive, in terms of ongoing rental costs, ISDN service was therefore debatable.

The explosive growth in the Internet we have seen since the emergence of W3 service a decade ago produced a huge demand for services with much higher throughput than standard ISDN. ISDN simply missed the boat.

ADSL

The basis of the recently introduced 'broadband' services in many parts of Australia, Asymmetric Digital Subscriber Line (ADSL) service was designed to provide high data rate services directly to customer premises. The asymmetry in ADSL reflects two factors (the same as in cable modem technology). The first is that interference and crosstalk problems in large bundles of multipair cables make it much more difficult to send high data rates upstream. This is because the upstream signal is at its weakest the closer it gets to the exchange, where it must share a large cable bundle with a large number of downstream signals which coming straight out of the exchange, are at full power levels. The second factor is that a large proportion of customer premises applications are inherently asymmetrical in behaviour, where downstream traffic is much larger than upstream traffic.

The ADSL service is designed to provide a range of transmission speeds, with speed traded off against distance. Nominal downstream rates are T.1 to 6,000 metres, E.1 to 5,000 metres, 6.312Mb/s (DS2) to 4,000 metres and 8.448Mb/s to 3,000 metres. Upstream rates range between 64Kb/s and 640Kb/s.

The intent with ADSL is to support compressed video (MPEG or H series protocol) downstream, as well as circuit switched traffic and packet switched traffic, such as IP. Because all of these traffic types require different quality of service and hence error correction or detection protocols, the ADSL protocol is complex and this will reflect in complex modem designs. A typical ADSL modem in the market today combines modem functions with an embedded IP router, and typically an Ethernet/802.3 network connection.

VDSL

The VDSL (Very high data rate Digital Subscriber Line) service is the fastest and most sophisticated of the DSL family of protocols. As such it is the most immature and at the time of writing was yet to be deployed.

VDSL is intended to provide comparable performance to cable modems, out to customer premises, using a combination of optical fibre and twisted pair. While optical fibre is by all means the best possible medium for data transfer, most Telcos consider the economics of running fibre to customer sites unsupportable by the short-term revenues it can generate. The compromise solution is similar to that being used by cable modem vendors, where optical fibre is used to distribute the service to a suburb, and copper twisted pair then to the customer's premises.

VDSL is conceptually similar to ADSL but much faster.

It is envisaged that VDSL will use integer fractions of the ATM transmission rates. The nominal 155Mb/s stream splits into three 51.84Mb/s, six 25.92Mb/s and twelve 12.96Mb/s streams. VDSL is intended to support 12.96-13.8Mb/s up to a distance of 1,500 metres, 25.96-27.6Mb/s to 1,000 metres and 51.84-55.2Mb/s to 330 metres. Asymmetrical upstream rates of 1.6-2.3Mb/s and 19.2Mb/s are envisaged, or a symmetrical rate equal to the downstream rate. It is expected that the higher asymmetrical upstream rate, and the symmetrical upstream rate will only be available for short cable lengths. Early implementations of the VDSL protocols are expected to support only the lowest upstream rates.

A large part of VDSL's use will be the transmission of video services, and to this effect a forward error control (FEC) scheme will be used. Useful bandwidth will thus be somewhat lower than the nominal bandwidth. It is expected that Reed-Solomon coding similar to that in ADSL will be used.

VDSL is intended to support passive taps much like cable modems do, with active taps as an option. As a result, VDSL systems using the passive option will share a similar topology to CATV while also using similar strategies for multiplexing upstream traffic (this is indeed a generic problem with branched segmented topologies).

Cable modem technologies

Cable TV technology has been around for many decades, and is a well developed and mature service in the US. The central idea in this model is to distribute TV carriers to household sockets through a coaxial cable. A single cable can be threaded through multiple sites, with a high impedance tap delivering the signal to the user's wall socket.

The classical CATV topology is a tree like structure, with branches fanning out from linear segments. Because a coaxial cable can provide a bandwidth of about a GHz, cca 150 television channels can be carried on the single cable. With about 6MHz bandwidth allocated to a channel, and typically only a fraction of the channels used, it was only a matter of time before somebody would think of exploiting the unused capacity.

Interestingly, the connection between Ethernet and cable TV technology is historically strong. When Metcalf and Boggs originally conceived the Ethernet LAN, they merged two then quite well established ideas – packet radio networking and CATV cabling.

To translate the model into a cabled, baseband environment, they used the most available technology base at the time – the CATV scheme. The original Ethernet trials were conducted using cable TV cables, terminators, taps and tapping tools. Only later did Ethernet diverge into different cabling.

The simplicity of the CATV scheme was possible because there was no upstream component of the signal. Because Ethernet had to provide a symmetrical bi-directional transmission scheme, the transceiver ('vampire') box had to be able to transmit and receive.

The idea that the cable modem is something new is quite wrong. The cable modem is merely an evolution which combines features of a number of schemes dating back to the seventies.

The fundamental limitation of schemes which attempted to modulate RF carriers with Ethernet-like packets was bandwidth utilisation. If you wished to squeeze the signal into a 6MHz bandwidth, it was at the expense of channel

throughput. If you wished to get full Ethernet bandwidth, you would end up devouring at least two channels. In either instance, you would require the radio frequency equivalent of an Ethernet transceiver, with a baseband drop cable to the host. To translate this idea into something which could be piggybacked on to the existing CATV infrastructure required some further technological evolution.

Three central technical issues constrain the cable modem. The first is that the medium and topology is not built for a two way symmetrical service.

Problems arise with sending traffic upstream from the subscriber. In a wholly passive tap arrangement, the typical problem is in getting enough signal pumped into the backbone which concentrates noise and interference from the large number of user sites at the upstream distribution point.

The second problem lies in bandwidth efficiency. An Ethernet-like signal must be squeezed into a 6MHz bandwidth. This calls for some clever thinking, with thousands of subscribers contending for dozens of channels.

The third problem lies in providing a suitable interface at the host end. Does one use a proprietary interface, an Ethernet interface, or does one simply devise a new standard?

When cable modems entered the market, no less than nineteen international vendors were contending for market share. Using largely proprietary modulations, the performance offered for upstream channels varied between 96Kb/s and 15Mb/s, and for downstream channels between 500Kb/s and 30Mb/s. Feature sets also varied widely, as did available modem interfaces. Some modems were implemented as plug-in cards, which relied on a device driver executed by the host to deliver the smarts.

Since then the market has settled and the DOCSIS standard has won out, displacing the early favourite IEEE 802.14 spec.

The DOCSIS standard, sponsored by the MCNS consortium and endorsed by the ITU standards body, is now well established in Australia and progressively displacing the proprietary Motorola CDSL (Cable Data Link Protocol) used initially in the Telstra cable network. DOCSIS itself has progressed from 1.0 to 1.1 and now to the faster 2.0 standard.

Some technical comparisons are worthwhile. Current CDSL products typically provide a peak 30Mb/s downstream in a 6MHz TV channel, and 1.532Mb/s upstream in a 600kHz channel. Noise and interference problems are handled by the cable modem adaptively switching between a 16QAM modulation and QPSK modulation, trading speed for error rate improvement.

DOCSIS 1.0/1.1 systems provide 30Mb/s downstream, and 5.12Mb/s / 10.24Mb/s upstream respectively. DOCSIS 2.0 improves the upstream channel providing symmetrical 30.72Mb/s maximum upstream channel capacity, using Synchronous CDMA techniques.

In practical terms the biggest issue Australian cable modem service users will have to grapple with is undersizing of the router and network capacity feeding into the cable network – as many readers will have observed by experience.

30Mb/s at the user end means nothing when the network it interfaces to is severely constricted.

Wireless broadband technologies

ADSL and cable modem technologies offer a major advance over POTS techniques, but do require cabling of suitable quality. While ADSL tolerates lower performance cable types compared to cable modem systems, it is also quite limited in performance, which drops off with distance from the



▲ ABOVE: The Angel Technologies HALO aircraft was to remain aloft for eight hours. Three aircraft were rotated to maintain a continuous presence.

exchange, and is inherently asymmetric which is great for web browsing but less so for other uses. If a user wants high up/downstream symmetric rates, he or she will have to live in a suburb with cable TV service and DOCSIS 2.0 availability.

An alternative which we can expect to see more downstream is wireless broadband, using microwave links. The available technology falls broadly into two brackets – systems in the 900, 2.45 and 5.8GHz ISM (Industrial Scientific Medical) unlicensed bands, and systems in the upper centimetric 28GHz or Ka band.

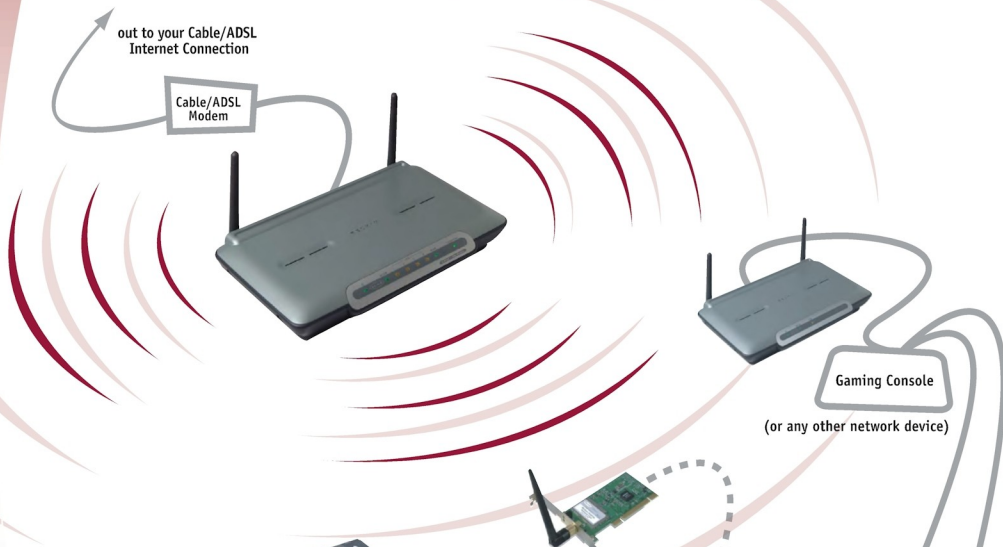
Both of these microwave bands have their pros and cons. The ISM bands provide for excellent weather penetration, and can cut through fog and rain reasonably well. Unfortunately the 900MHz band allows for little throughput, while the 2.45GHz band overlaps with leaky domestic microwave ovens, and the 5.8GHz band doesn't penetrate walls particularly well. The IEEE 802.11 standards family in its various flavours permits 2Mb/s, 11Mb/s and 56Mb/s throughput, with some proprietary flavours pushing out to 80Mb/s peak throughput. Used for wireless LANs the ISM band standards offer interesting longer term opportunities.

Two major research projects are currently underway to develop suburban ad hoc networks in which rooftop antennas are used to provide single hop microwave connections between individual households in a suburb or university campus. With a big enough population of households equipped with such systems, the suburb acquires a wireless network capable of delivering broadband performance but doing so with user owned rather than Telco owned equipment. Packets hop from house to house until they reach a destination – be it an end user or an ISP node connecting outside the suburb.

The first such project was launched at Monash Uni Computer Science by Dr Ron Pose and myself in 1998 under the label of 'Suburban Ad Hoc Networks' and aims to create a protocol suite with extensive encryption and security



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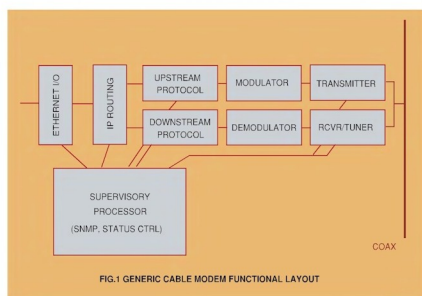


FIG.1 GENERIC CABLE MODEM FUNCTIONAL LAYOUT

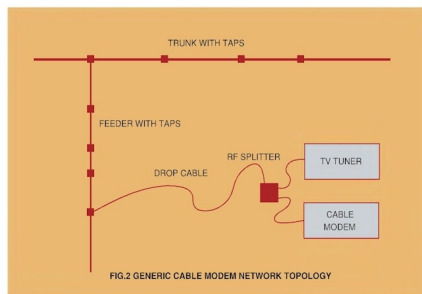


FIG.2 GENERIC CABLE MODEM NETWORK TOPOLOGY

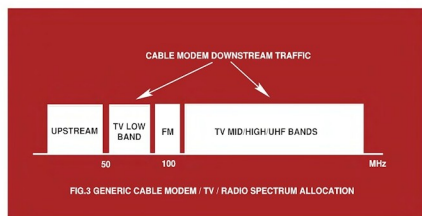


FIG.3 GENERIC CABLE MODEM / TV / RADIO SPECTRUM ALLOCATION

↑ ABOVE: The cable modem leverages a number of established technologies in a single compact package. At the most basic level is an IP router which is equipped with a radio-frequency mode interface to the cable TV system. The typical topology used is a tree structure, which branches out via taps to end users.

mechanisms to provide transparent, reliable and secure suburban or campus wide high speed wireless connectivity for end user access. The network is self organising and at some point connects into an ISP node with high speed connectivity out of the suburb. With user owned rooftop links the end user only pays for the ISP bandwidth out of the suburb and thus is freed from expensive line rental service fees incurred by ADSL or cable modem services. This project is ongoing (www.csse.monash.edu.au/research/san).

In the US two players pursued a similar track. Rooftop.com used a centralised model with wireless routers flooding the suburb – they were acquired by Nokia some time ago. The limitation of their model lies in the use of centralised nodes, and in a very lightweight security architecture.

MIT's Roofnet is currently in the experimental trials phase, and like the Monash SAHN project, relies on off

the shelf 802.11 wireless LAN hardware and unique software (www.pdos.lcs.mit.edu/roofnet). The principal difference between the MIT and Monash projects is that MIT use a lightweight security architecture and Monash a heavyweight one – the routing algorithms used in both are very similar.

The key longer term issue for suburban ad hoc wireless networks will be the security and encryption architecture – the problems seen now with 'whackers' breaking into wireless LANs become even more severe with a self organising wireless net in the suburbs. With the ongoing trend to increasing wireless interface speeds, throughput per dollar invested is not going to be an issue.

The 28GHz Ka band offers potentially much better throughput than the ISM bands, and permits extremely tight 'pencil beam' transmissions over distances of many kilometres. It has one compelling drawback – at 28GHz fog, haze and rain can kill a microwave link dead in mere hundreds of metres, due to microwave scattering and absorption by moisture and rain droplets. This will be a major impediment in the EU and US where the biggest markets exist, even if the technology is viable for drier parts of the Australian continent.

A future alternative to the 'user owned' rooftop 802.11 network is the Telco or ISP owned 802.16 (WiMAX) network, based on the recently ratified IEEE 'Wireless Metropolitan-Area Networks (MAN)' standard. Operating in the 10 (Ku) to 66 (Ka) GHz and ISM bands, 802.16 aims to provide Megabit/s class subscriber access, with 120 Megabit/s base stations feeding up to 60 users each.

Perhaps the most interesting Ka band proposal to surface was the unsuccessful Angel Technologies HALO system, which absorbed a large amount of investor funds before quietly disappearing off the scene some years ago.

The HALO system is based upon the idea of lifting a communications payload analogous to that carried by a satellite to a stratospheric station above a metropolitan area. The means of lifting the payload is a stratospheric long endurance aircraft, in concept similar to the U-2 'spyplane' of early sixties fame. Instead of pointing their antennas at a satellite in orbit, subscribers point their antennas at a patch of sky above the city, where the aircraft flies in a continuous circular pattern, or orbit.

In effect, the HALO system provides a metropolitan area with its own private 'pseudo-satellite' or 'pseudolite', sitting at 50,000ft rather than the hundreds, thousands or tens of thousands of kilometres characteristic of a real satellite.

The Angel Technologies HALO aircraft was to remain aloft for eight hours, pretty much a limit set by pilot endurance, with three aircraft rotated to maintain a continuous presence, each carrying a streamlined six metre diameter 0.8 tonne communications pod with 28GHz millimetric band equipment. While one is on station another is either climbing or descending to/from station, with the third acting as a hot spare on the ground.

The HALO system never made it commercially but it is a good example of the possibilities which exist for wireless broadband.

In summary, there are many paths which broadband technologies could follow in the future, and until Telcos are prepared to make the investment of putting optical fibres into every household, we are likely to see many weird and wonderful ideas crop up.

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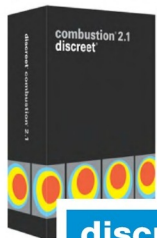
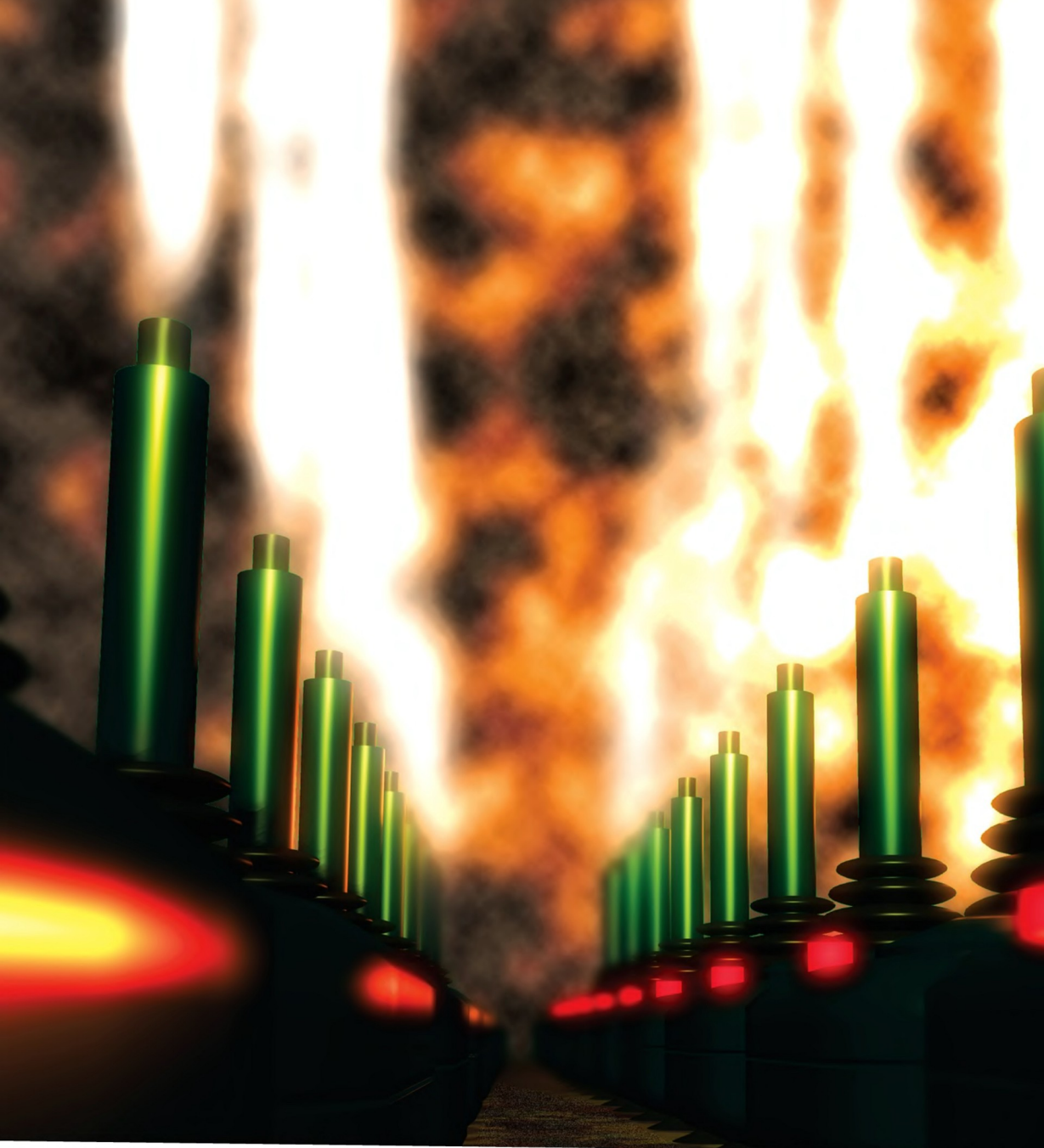
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'Do joysticks dream of electric hands?' by Ian Ritter



The idea behind the image was simply the way that many games these days are mass produced with little or no inspiration or originality, and are simply cash generators for the next sequel, hence the industrial feel. The joysticks were built in Simply 3D 2, and then thumped around in Photoshop: rendering some clouds, blurring a bit, and finally some glare added and the logo burnt on. Time taken from start to end was just under four hours.

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REVIEWS



Enthusianasia

CPU makers are targeting 'enthusiasts' but John

Gillooly is convinced they have missed the point.

I have spent most of September on the road at Intel's Developers Forum in San Jose and at Computex in Taipei gathering info on the latest in tech and I have been noticing a rapid shift in my vocabulary. I call product roundups group tests, business cards are name cards, mobos are mainboards, graphics cards have become VGA cards, the list goes on.

But the one term I keep finding myself using and then feeling dirty about is enthusiast. This is the new marketing term used when companies want to pitch a product at people like us, the tech lovers, gamers, overclockers, geeks, nerds, case modders etc. It's a convenient catch-all phrase, and is so easy to use when describing *Atomic* to those who have only been exposed to mainstream computer mags. But I hate it when I find myself using it, purely because of the marketing connotations.

I'm enthusiastic about computers, but then I am also damn enthusiastic about making sure I have a shower every day. This doesn't mean I scour the back alleys of Taipei looking for a great deal on high pressure massaging shower heads. Just look at two of the main products riding on the 'enthusiast' product segmentation to understand what I am getting at.

AMD and Intel both recently announced new 'enthusiast' CPUs – the Athlon 64 FX and the Intel Pentium 4 Processor with HyperThreading Technology Extreme Edition (with which Intel sets a new record for processor name length). Both are essentially rebadged Server CPUs, designed to give gamers that little bit of extra power needed to run games at ridiculous speeds.

It is not a new idea – video card companies pioneered the use of small quantity high end models to gain mindshare among people like us. And they actually deliver products that have sufficient architectural differences to the mid range of cards, which means that we win from the relationship. The average user will be happy with a mid or low range card, and us performance nuts can splurge a little and get that RADEON 9800XT or GF FX 5950 that lets us enjoy the high framerates and spanky graphics that we deserve.

But CPUs are different beasts. While GPUs

have become highly specialised, and highly complex, floating point processors, the CPU always needs to be a general purpose device. A 2.4GHz C model Pentium 4 when overclocked to 3.2GHz will perform the same as a 3.2GHz Pentium 4, but a RADEON 9600 overclocked to RADEON 9800 speeds will not deliver the same performance.

We know this and it's why we overclock. The philosophy has always been get a low end processor and triple its value with a front side bus adjustment, which is why bottom end CPUs like the Celeron 300A, Athlon AXIA stepping, Pentium 4 1.6GHz Northwood and the Pentium 4 2.4C have proved so popular.

So it beggars belief that Intel and AMD are targeting enthusiasts with processors priced higher than their normal versions. Intel have been a little bit smarter by making the Extreme Edition compatible with existing mobos, but AMD launched its Athlon 64 FX in the form factor used for servers and workstations, not desktops.

Do they really think that the most savvy of computer users will fall for the 'targeted at enthusiasts' marketing line, especially when logic dictates that we would be better off buying a slow but overclockable CPU then pumping the extra money into a great mobo, some CAS 2 DDR400 or even a high end video card? Doesn't AMD realise that if the Opteron was such an amazing desktop CPU, enthusiasts would have already gone out and bought one?

Don't get me wrong, if I won the lottery I would probably splurge on the highest of high end systems, just cause I can. But am I really going to sell my soul to Satan to jump from a 64-bit to a 128-bit memory bus even though it will be crippled by a feature poor workstation motherboard and the need for registered DDR? Does 2MB of L3 cache really make me want to mug old ladies to get my hands on a rebadged Xeon?

I know I sound rather enthusiastic about this issue, but when you sit in keynote speeches, briefing rooms or walk around a show floor and have companies rave on about how people like us are desperate for CPU performance at any cost you start feeling a little bit dirty. It's just as well I am also a shower enthusiast, I guess.

BENCHMARKS

At Atomic, it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic Labs*.

SYSmark2002

SYSmark2002 is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The focus of the benchmark is on Internet Content Creation and Office Productivity tasks, which combine to produce a final performance rating.

Unreal Tournament 2003

UT2K3 is the latest and greatest first person shooter from Epic. The game makes use of the new Unreal Warfare engine, and as such is a perfect benchmark for system performance. We use HardOCP's (www.hardocp.com) benchmarking utility to run a series of flyby benchmarks at varying resolutions to test performance. The utility also features support for a low resolution/high geometry CPU test. Results are in average frames per second.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo, which outputs an average framerate

trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for making comparisons between video chipsets.

HSF testing – Chernobyl

To test heatsink fans we use our custom engineered CPU replicator, known as Chernobyl. This beastie pumps a variable wattage through a solid Copper CPU die replica, with a temperature probe mounted in the exact centre of the die replica. Chernobyl results are not directly comparable with real world temperatures, but do provide a very accurate benchmark.

Quake 3: Arena AtomicMPC demo

Quake 3: Arena (Q3A), from id Software, is a very popular first person shooter, and represents widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, so we developed our own *AtomicMPC* demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance, or a particular facet of 3D, such as T&L. We can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark to perform these tests. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HDD heatsinks.

Atomic Hot Award

The *Atomic HOT* award is given only to the most kickarse products to hit the Labs, ones that score nine or greater.



ATOMIC TESTBENCH SPECS

Both test systems use Windows XP Professional with Service Pack 1, DirectX 8.1 and the latest chipset and video drivers.

- AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA: www.cassa.com.au)
- Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT: www.abit.com.tw)

Common components

- Corsair TwinX XMS3200 matched dual-channel DDR-RAM (supplied by Altech www.altech.com.au)
- Hercules Prophet II GTS 32MB (supplied by Guillemot: <http://au.hercules.com>)
- 64MB Apacer memory keys (supplied by Anyware: www.anyware.com.au)
- Hercules Prophet II GTS 32MB (Supplied by Guillemot: www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia: www.creaf.com)
- ASUS 52x CD-ROM (supplied by CASSA)
- Belkin PCI FireWire card (supplied by Belkin: www.belkin.com.au)
- Belkin PCI USB 2.0 card (supplied by Belkin)

BENCHMARK SETTINGS

3DMark2001SE Pro

- 1,024 x 768; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.
- 1,024 x 768; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.
- 1,600 x 1,200; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer.
- 1,600 x 1,200; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer.

Quake 3: Arena AtomicMPC Demo

All tests use Quake 3: Arena 1.27g and our custom Q3A demo recorded by the *Atomic* staff.

- CPU testing: 320 x 240; maximum geometry detail; minimum graphics settings; high sound quality.
- Graphics cards: Low quality – 1,024 x 768; normal quality graphics settings; sound disabled.
- Medium – 1,280 x 1,024; maximum graphics settings; with all game sound disabled.
- High – 1,600 x 1,200; maximum graphics settings; with all game sound disabled.



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[FEATURES]

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- New SMARTSHADER™ 2.1, SMOOTHVISION™ 2.1, Unique VIDEOSHADER™ engine, ATI's new FULLSTREAM, Hydovision



ATLANTIS RADEON 9600 PRO

[FEATURES]

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[FEATURES]

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- 128-bit floating-point colour precision allows for a greater range of colours and brightness engine uses programmable pixel shaders to accelerate video processing



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Framerate

Locking our incredible ATI cards away in a lead box, we let NVIDIA strut their stuff this month. Has the evil jinx of the FX finally been smashed?



➔ AOpen Aeolus FX5900 Ultra

SPECIFICATIONS: NVIDIA GeForce FX5900 Ultra; 256MB 256-bit DDR RAM; dual-400MHz RAMDACs; TV-out.

CORE SPEED: 450MHz **MEMORY SPEED:** 850MHz **PRICE:** \$1,099

WEBSITE: AOpen www.aopen.com.tw

SUPPLIER: Blue Chip IT www.bluechipit.com.au

The Aeolus managed to reach, and, in real world testing, actually take over all of the 9800 PROs. Incredible. What needs working on now is the rather *ail-ous* high price. Sure, it resides amongst the best at the apex of the Atomic Framerate Chart, but unfortunately it's also one of the most expensive.



➔ Jaton 3DForce FX5900-256

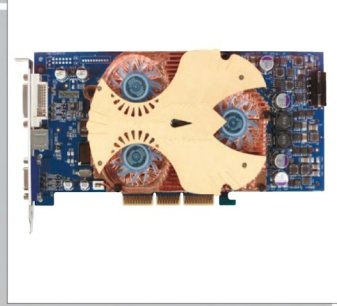
SPECIFICATIONS: NVIDIA GeForce FX5900; 256MB 256-bit DDR RAM; dual-400MHz RAMDACs; TV-out.

CORE SPEED: 400MHz **MEMORY SPEED:** 700MHz **PRICE:** \$785

WEBSITE: Jaton www.jaton.com.au

SUPPLIER: Jaton www.jaton.com.au

It's almost rare to see a 256MB video card take over a 128MB version of the same, but this one did just that. Beating this month's Albatron FX5900PV, albeit by a few points, it still shows that a doubling in memory isn't a major performance factor. It is interesting to note, however, that the memory speed on this card is slower.



➔ Albatron FX5900PV

SPECIFICATIONS: NVIDIA GeForce FX5900; 128MB 256-bit DDR RAM; dual-400MHz RAMDACs; TV-out.

CORE SPEED: 400MHz **MEMORY SPEED:** 850MHz **PRICE:** \$589

WEBSITE: Albatron www.albatron.com.tw

SUPPLIER: AMI Computers www.ami-computers.com

The FX5900 PV is really wise, apparently, as it comes kitted with the patented Wise Fan technology. By default, only two fans operate, but if one goes bung, the third 'backup' fan kicks in. Besides its wisdom levels, it's a great performer – and what makes this extra special is it's just under \$200 cheaper than the similarly performing 3DForce.



➔ Albatron FX5600P Turbo

SPECIFICATIONS: NVIDIA GeForce FX5600; 128MB 128-bit DDR RAM; dual-400MHz RAMDACs; TV-out.

CORE SPEED: 325MHz **MEMORY SPEED:** 600MHz **PRICE:** \$289

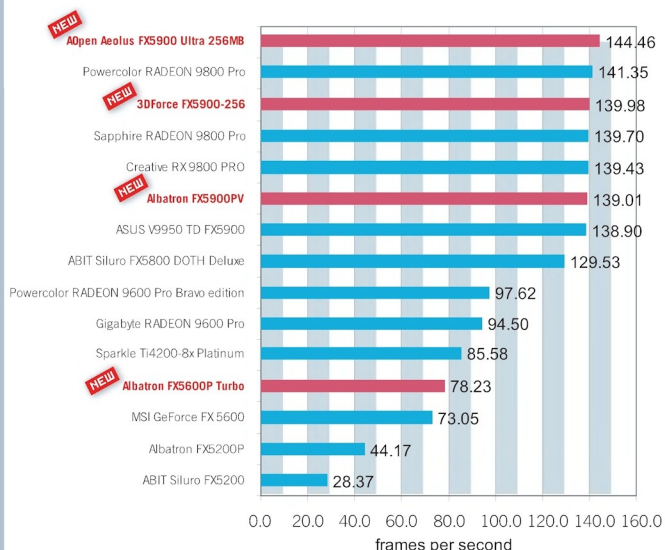
WEBSITE: Albatron www.albatron.com.tw

SUPPLIER: AMI Computers www.ami-computers.com

Performing faster than MSI's FX5600 in both the real world and synthetic tests, it still retains the high quality inexpensiveness we've come to expect of Albatron. It's definitely a great FX5600 card, and for that price, perfect for those with 'budget' in mind, but not after a sloppy performer.

Video cards

Unreal Tournament 2003 – 1,280 x 1,024

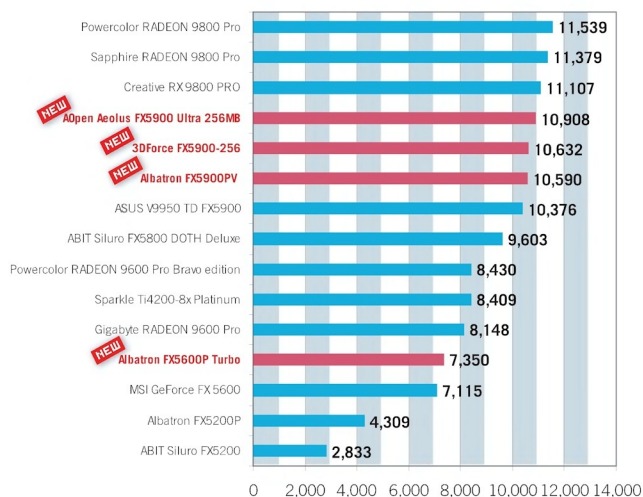


Over the past month the video card industry has started revitalising. With NVIDIA and ATI trading blows and insults with the launches of ATI's RADEON 9800XT and NVIDIA's GeForce FX5950, the real battle is shaping up to occur in the mid range with ATI's RADEON 9600XT, XGI's Volari 5, S3/VIA's Deltachrome and NVIDIA's soon to be announced successor to the GeForce FX 5600.

XGI is the former graphics division of SIS, which has acquired Trident's graphics division. The new company is dedicated to developing chips for graphics cards, rather than for Northbridge integration. Its Volari series includes the first dual processor cards we have seen in a long while and should deliver competitive performance. The formation of XGI is one of the most significant things to happen

CPUs

3DMark2001SE Pro – 1,280 x 1,024



Athlon 64 has launched with significant performance gains. Now the challenge is to deliver decent numbers of CPUs to market. The buzz around Computex this year was that AMD will struggle to deliver large numbers, and many mobo manufacturers will initially be bundling their boards with CPUs.

The other rumour is that motherboard support for the enthusiast level rebadged Opteron, the Athlon FX-51 will be poor, as manufacturers focus on building boards for the much more common Socket 754 Athlon 64 CPUs.

Intel's answer to the Athlon 64 has been to launch the Pentium 4 Extreme Edition, which is essentially a 3.2GHz Xeon chip. Intel has added an extra 2MB of L3 Cache, but just like the Athlon 64 FX-51 we wonder how many gamers will bother spending megabucks.

Shuttle XPC SN85G4



Athlon 64 hits town. Nathan Davis collides with the floor.

Specifications:

Shuttle FN85 mobo
(Socket 754);
NVIDIA nForce3
Northbridge; AC'97
5.1 audio with
s/PDIF in/out;
10/100Mb/s
Ethernet port; one
AGP 8x; one PCI;
USB 2.0; FireWire;
SATA; six-in-one
card reader.



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www.satotech.com.au

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Shuttle
www.shuttle.com

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SATO
(03) 9899 6333

Price:

\$TBA

Having survived the whole XP saga, it seems AMD are only too ready to continue a new cliché. Possibly sparked by NVIDIA, FX is 'the now', apparently, and is the name the ultra version of the 64-bit Athlon has taken on. This runs on the same socket as the Opteron (Socket 940) and, unsurprisingly, will be pimped primarily to gamers.

However, we really don't see how the FX will be all that popular, with a new socket design due to come into place (Socket 939 – hoorah for one

less pin), this is really going to shake any decent support for it by both the consumers and motherboard manufacturers. Put simply, we believe that was a bad move by AMD.

This is where the standard Athlon 64 jumps into action, and it jacks into the new Socket 754 boards – which won't be changing too soon. This is aimed at the more affordable market and here we have a system, which is, as far as we know, the world's first barebones system to support the standard Athlon 64 (full bragging rights).

Unsurprisingly it's made by market leader, Shuttle, who are really in for some hot action with their new 64-bit nForce3 board, the FN85. Interestingly enough, this motherboard is not Dual Channel capable.

We tested this system using an Athlon 64 3200+ and what we really wanted to know was how it stacked up in the real world. Currently the real world exists minus a stable working build of Windows XP 64-bit. Being pre-alpha, WinXP64 is far too immature in both drivers and stability and, with no normal human actually having access to it, screw testing with it. The processor was built with 32-bit support in mind, so it was interesting to see how it really performed against today's power machines.


We threw it up against our 'unbeatable' Pentium 4 3.0GHz, which we clocked up to 3.2GHz to see why AMD are using this bothersome naming convention. For the sake of numbers, the Athlon 64 3200+ runs at stock 2.0GHz, so if the 3200+ market speak means absolute squat, AMD are going to look super stupid.

Though, as John Gillyooly mentioned in last month's *Sealed Section*, AMD have proven MHz to mean saccharine-jack-all when it comes to actual testing. But we still

disagree with their naming conventions. It's just, crap.

Running off an effective FSB of 400MHz, this is instantly the first theoretical disadvantage, as the 3.0GHz P4 whores away on an effective 800MHz FSB (more so since we bumped it up). We benched the P4 on the very speedy Albatron PX865PE Lite Pro board (also with no Dual Channel). Common components were two sticks of 256MB DDR400 (Kingmax) and a 128MB GeForce4 Ti4800SE.

Looking at the scores, suffice to say, the Athlon kicks royal arse, and rightly so, this system walks hand in hand with the new beastly chip. In SYSmark2002, it came in under par in overall rating and the P4 optimised ICC, but it managed to scream ahead in both OP and in the testing that actually matters to us – real world. As more real world applications are optimised for 64-bit processing, the scores will severely rise – but even now the excellent performance is obvious.

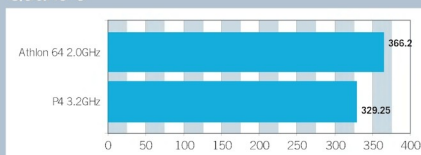
It's great to see that Shuttle are not afraid to leap ahead with new tech, rocketing in head first with both AMD's Athlon 64 and NVIDIA's nForce3 – and paying off quite well with ball-gripping results. If you feel the urge to scare the pants off your mates, this system will satisfy in housing said foreboder of chinós. 64-bit is here. 

Benchmarking

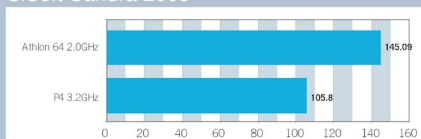
SYSmark2002



Quake 3



SiSoft Sandra 2003



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Pentium 4 3.2GHz Extreme Edition



Intel whips out new Pentium 4. Nathan Davis discovered minus daks.

Specifications:

Pentium 4 3.2GHz;
16x multiplier;
200MHz FSB;
0.13-micron; 2.5MB
total cache.



Supplier:

Intel
www.intel.com

Website:

Intel
www.intel.com

Phone:

N/A

Price:

\$TBA

Without a doubt, we can pronounce now as being the most exciting time in quite a while for the CPU market sector. It's only just exploded into a beautiful fiery ball of glorious competition. AMD have let loose their highly anticipated 64-bit hounds onto the thirsty desktop market. But without even so much as a hint, Intel too were working on something –

though behind top secret closed doors – planning a chip of cunning extremities. After several rumours, in jaw-breaking style they announced for the first time a new Pentium 4 during day two of the 2003 Intel Developer's Forum. It was totally unexpected but this wafer of silicon is a highly welcome revelation.

The chip is called the Pentium 4 Extreme Edition (P4EE), and is rightly named, as Intel have fabricated it with a remarkable 2MB of Level 3 cache. Yes, you read correctly – that's on top of the existing Level 2 512KB, thus equalling a total of 2.5MB on-die cache. The debut unit we sourced runs at the current peak retail speed of the standard Pentium 4 – 3.2GHz. Obviously this processor is an open assault on AMD and a ploy used to woo the market from jumping straight into bed with the Athlon 64/FX.

Rumour has it that the P4EE is a merely a pumped up Xeon (perhaps a rebadged, revamped Gallatin), clocked with a faster core frequency and 800MHz FSB support. Like the Xeons, this CPU is scoped towards the higher end of the market, but rather than servers and high-end graphics machines, it's directed toward the hardcore gamer (as with AMD's new 64-bit supporting x86 32-bit hybrids). As most gamers expect affordable performance, we struggle to see how the P4EE will be popular, as these are expected to hit the Australian market at the beginning of next

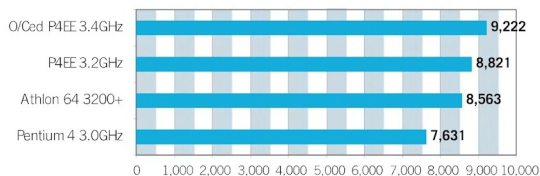
year around the \$1,500 mark. Something so rich is really only accessible to the absolute hardcore who live in money-tree plantations.

The specs are to kill for, the price is matchingly painful, but how does it really stack up? With the new booming CPUs hitting town, we decided to thrash the P4EE against both an Athlon 64 3200+ (2.0GHz) and a Pentium 4 3.0GHz. As much as we would have liked, at the time of review we didn't physically have access to an Athlon FX, so unfortunately we were unable to include one for testing. Damn you, wretched real world. For an excellent overview on the FX's performance, check out John Gillooly's 'Sealed Section' article from last month – just keep in mind these tests are not directly comparable.

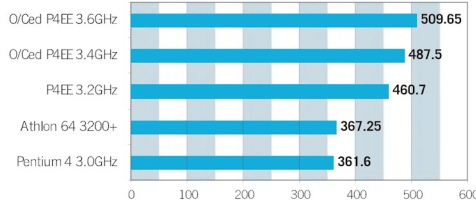
Common components among all three processors include the AOpen Aeolus FX5900 Ultra, and two sticks of Kingmax 256MB DDR400. Corsair RAM wasn't used, not only because Intel are explicitly against it for

Benchmarking

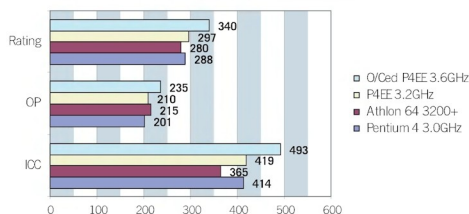
3DMark2001SE Pro – 640 x 480



Quake 3: Arena – CPU test



SYSmark2002





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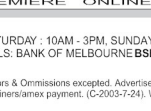
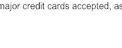
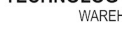
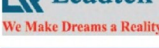
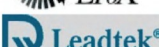


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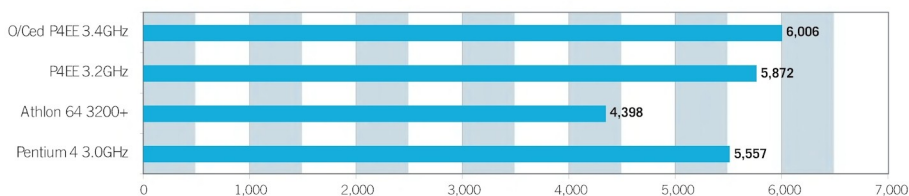
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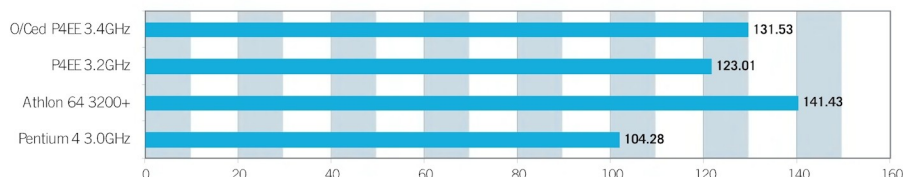
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Benchmarking

AquaMark3 – CPU score



Unreal Tournament 2003 – CPU test 640 x 480



incompatibility problems, but we too have been having our own tribulations. The motherboards used were the Intel Bonanza DB75PBZ for both Pentium processors, and Shuttle's feisty FN85 for the Athlon 64. As usual, the problematic Hyper-Threading was disabled.

Glancing at the scores, you can probably tell this chip is a can of total whoop arse. The additional 2MB of cache really helped in shooting this CPU to the top, continually flogging the Athlon 64 3200+ apart from UT2003 (even when overclocked to 3.4GHz). Q3A produced a massive lead for the P4EE, giving off the highest average framerate from a desktop processor in the *Atomic Labs*. Obviously the difference between 100 and 500 frames is negligible to the human eye, but this really demonstrates the power of this processor – attracting the envy of others. In AquaMark3, the Athlon 64 quite surprisingly came in under the P4 3.0GHz. It's highly possible this is due to the FN85 board's restrictive 400MHz FSB.

Of course, we overclocked the P4EE (stock cooling), and we reached a very respectable 3.6GHz. Interestingly enough it chugged away nicely at this speed for both the Q3A and SYSmark2002 benchmarks, but it halted the system on all other tests. With better cooling, this problem would be eradicated, as the tests causing this are the one's really pushing the processor.

Because we tested the Athlon 64 in the Shuttle XPC SN85G4 barebones system (reviewed [page 60](#)), even though it's a great performer, it wasn't made with overclocking in mind so the max we could bump it up to was just under 2.1GHz. This isn't doing the chip justice, so stay tuned for something very special next month.

The P4EE is a brutified attempt to hold the market back from jumping on AMD's 64-bit bandwagon. With performance like this, who's complaining? The chip itself may be expensive, but look at it from another angle – it's a new, powerful processor without the requirement of

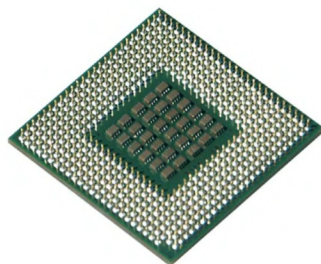
having to purchase an entirely new motherboard with a different socket type. You need only one of the multitudes of currently available Socket 478 boards with a quad-pumped frontside bus speed of 200MHz.

It's practically worth selling both your kidneys for. Although, due out January next year, you'll have more time to acquire yourself a cash stash in a less painful manner. But will this processor continue to hold out as the best? Perhaps AMD, too, have a secret processor. Only time will tell.

We can only speculate as to how far the x86-64 Athlon 64 will actually come on top when optimised 64-bit desktop applications and OSes come to light. Theoretically, 64-bit will burn the socks off the ageing 32-bit x86 architecture when far more supporting code exists. Ironically, the Athlon 64's advantage is it being based around x86 instead of the full-blown 64-bit IA-64 architecture. This way, when the time comes, we are smoothly weened over, instead of being thrown to the lions. But *when* is the ultimate question – and that's now in the hands of the software developers.

For now, Intel's P4EE has swallowed the wind out of AMD's almost-billowing sails in one rewarding gulp. Intel

could have announced it earlier, but they waited, for obvious competitive reasons. Although not yet released, we crown the Pentium 4 Extreme Edition as reigning champ of the desktop processor world.



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Albatron PX865PE Lite Pro



Powerless to withhold his de-Lite, Nathan Davis bounds about like a crazy mofo.

Specifications:

Intel 848P
Northbridge; Intel
ICH5 Southbridge;
SATA; USB 2.0;
AGP 8x; six-channel
AC'97 audio;
onboard 10/100Mb/s
Ethernet.



Among Albatron's newer boards, the PX865PE Lite Pro is one of the first based around Intel's recently released 848P chipset. Confused? The name is slightly misleading, as it uses the 'Lite' or cut down version of the 865PE chipset. Basically, the 848P is the 865PE chipset minus the Dual Channel DDR – instead kitted with Single Channel DDR. Wherever Intel finds these confusing code names is utterly beyond us, so this was likely an attempt to blur the perplexity factor.

Being a Single Channel DDR board, this does indeed keep the costs down but theoretically, with such anti-superior technology, it should reap performance somewhat akin to a common Single Channel P4 board.

We sourced Albatron's PX865PE Pro II board for testing against – and just to hurl you back into the black hole of confusion; this board does in fact use the 865PE chipset.

Both motherboards boast support for 1GHz Front Side Bus speeds (250MHz quad-pumped) and up, making room for some sensationally feisty overclocking.

One notable flaw we discovered with the board was when trying to use DDR333 memory with our 3GHz P4, it simply wouldn't run at full speed, settling down at 320MHz because DDR333 defaults to 1.6 times the speed of the FSB. The ratio can be changed, but the next level up is 2 times the speed, so unless the memory is of extreme quality, well, bugger. We read through several papers and found this is a known problem for both of Intel's 848P and 865PE chipsets when used in conjunction with an 800MHz FSB processor. The only workarounds are to wait for memory manufacturers to meet Intel's updated DDR validation specification, purchase some DDR400+ or overclock the FSB by a few notches.

Common components used were two sticks of 256MB Kingmax DDR400 RAM, a Pentium 4 3.0GHz (with Hyperthreading disabled) and a 128MB GeForce4 Ti 4800SE. As you can see from the result charts, we performed the highly theoretical memory bandwidth test with SiSoft's Sandra2003 on both boards. As expected the Dual Channelled Pro II came out on top, but screw theory until it melts into a hot globby pool. Looking at how close the scores came, it seems many real world applications aren't keen enough to accept the newly available levels of extreme bandwidth. This board seems to show all too readily that Dual Channel with all

its doubled up goodness, in many cases, simply can't be taken full advantage of just yet. Proceed with The Scratching of Craniums™.

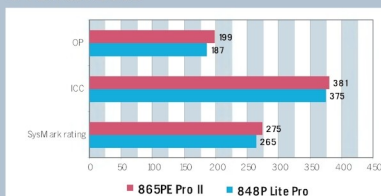
Overclocking couldn't get much better than this. In the frequency menu, you are provided with a myriad of options, including setting the frequency ratio of your memory to your processor; increasing the Vcore, AGP and DDR voltage in steps of +0.1V (+0.05V or smaller would have been nicer), the ability to detail the AGP/PCI/SPC timings or leave as auto, and setting the FSB frequency rate (duh!) among others. Unable to resist we pushed our 3GHz P4 to a stable 3.70GHz (FSB of 247MHz) – using standard air-cooling. To state the obvious, this is stupidly impressive. Surprisingly the 865PE Pro II board wouldn't let us go that far, primarily because it's programmed with less stressful frequency options. Oh, additionally it's \$298. . .

Apart from a few minor memory problems, for a budget board, at \$175 its performance is simply astounding – bettering its bigger brother in terms of tweakability. This insane motherboard will be nothing less than an orgasmic delight for anyone looking for a solid, inexpensive overclocker. In the words of Firesign Theater, 'My brain has been boggled and made soft'. This one's gold.

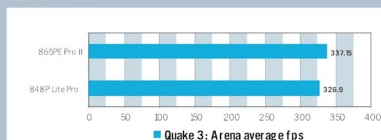


Benchmarking

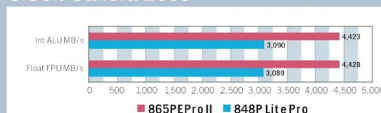
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Quake 3



SiSoft Sandra 2003





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Shuttle XPC SN62G2



Specifications:

Shuttle FB62 motherboard; Intel i865G Northbridge; AC'97 5.1 audio with S/PDIF in/out; onboard video; two 10/100Mb/s Ethernet ports; one AGP 8x slot; one PCI slot; USB 2.0; SATA; ICE heatpipe cooler.



Supplier:

SATO
www.satotech.com.au

Website:

Shuttle
www.shuttle.com

Phone:

SATO
(03) 9899 6333

Price:

\$615

The ability to have a sexed-up high-powered beast confined to spaces as small as a gerbil's home is incredible. Very few manufacturers can lay claim to such design ingenuity as Shuttle – they are, after all, the folks that fashioned the mini PC into a niche.

The XPC SN62G2 is a socket 478 system based around Intel's i865G chipset. Like the SN45G (*Atomic 33*,

page 58), it supports 800MHz FSB, and is kitted with two Dual Channel DDR memory slots. For network connectivity, they opted for two 10/100Mb/s Ethernet ports.

As with most mini PCs, only video cards that are non-PCI slot hogging will fit, thus ruling out many FX cards. If positioned one slot's-worth to the right, most cards would fit nicely without major surgery, but this isn't the case.

After throwing in a Pentium 4 3.0GHz, 512MB of DDR400 and a 128MB Ti4800SE card (the onboard video is capable of sharing up to 16MB system memory), we ran the Quake 3 Arena CPU benchmark – scoring a very respectable 346.95fps. This demonstrates what's so attractive about these PCs – small in size, large at heart. Like a Jack Russell.

There are several overclocking options and the FSB is capable of reaching 255MHz, but it scarcely wanted to go over a 5MHz increase in the FSB with our highly overlockable 3.0GHz P4. Not designed for overclocking, this is best left alone without chillier-than-air cooling.

This mini bundle of black beastly glory is an awesome performer, and with two Ethernet ports, it's a worthy contender for a deceptively small monster LAN box – or even a desktop replacement.

ND



Soltek Qbic EQ-3401M

Specifications:

Soltek SL-B8E-F motherboard; Intel i865G Northbridge; AC'97 5.1 audio with S/PDIF out; onboard video; 10/100Mb/s Ethernet port; one AGP 8x slot; one PCI slot; SATA; USB 2.0; IEEE 1394.



The last time we looked at a Soltek Qbic mini-barebones was the 3000M in *issue 28*, and it performed just fine, but the internal design is what really let it down. Several months later and Soltek have created one based around Intel's i865G chipset. The outside looks nice. . .

Regardless of this case being significantly larger than Shuttle's

SN62G2 and containing two 5¼in bays, everything is very cluttered and hard to access, making this one of the worst to navigate through.

It's also one of the most flimsy cases we've come across – too willing to give way to any form of pressure, in particular the drive bay, making for a horrid time when attempting to attach/detach it. The addition of stealth drives is great, but not when the flap catches on the optical drive's cog-work and creates a *wonderful* row of 'clicks'.

Just like the Qbic 3000M, it doesn't come with a custom heatsink, opting instead for the requirement of a standard Intel HSF, resulting in chewed cables if not properly secured.

This case's internal design is among the worst ever, saved only by its reasonable performance. Using the same common components as the SN62G2, it spat out 334.70fps in Quake 3 Arena. This kind of performance is acceptable, but not as good as the barebones above, which uses the same chipset.

It would seem Shuttle continues to raise the bar so high that other manufactures can't reach the same standard for mini barebones PCs. The 3401M performs reasonably well and looks great, but unfortunately it's built worse than a backyard shit-hole.

ND



Supplier:

Altech
www.altech.com.au

Website:

Soltek
www.soltek.com.tw

Phone:

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(02) 9735 5655

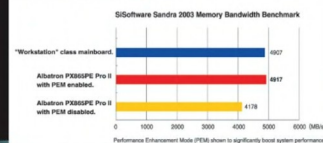
Price:

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Albatron's i865PE based mainboard with PEM technology challenges "Workstation" class mainboards.

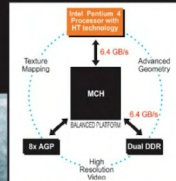
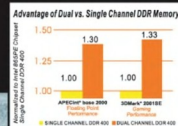


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- Support 6 USB 2.0 / 2 IEEE 1394 Fire Wire Ports
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This Gigabit switch proved a challenge to test. One of the limitations facing PCI is one of bandwidth. That being, it is limited to a 33MHz bus, which is 132 MB/s of available throughput. And that bus is shared. Now, not all of us are graced with the funds for multiple 64-bit systems, which would allow a Gigabit network to stretch its wings. So we had to make do with the supplied 32-bit PCI 100/1,000 network cards.

The hard drive could also impact performance. Unless running RAID 5, SCSI hard drives in each system, it is unlikely that your drives will keep up with the

speed the bits of data fly across a small Gigabit LAN. So, when testing, we set up a RAM drive on each system, and ran AIDA32 with the network benchmark plug in from those RAM drives.

The results were disappointing due to the PCI bus choking the bandwidth. CPU load was high during the transfer, as it tried to cope. We managed an average rate of 38MB/s, which doesn't equate to expected performance.

Our next attempt was a real world type simulation. Let's call it a 'leech', for want of a better word. We grabbed a folder containing 14GB of video files, zipped files and compressed audio, a total of 24,971 files over 803 folders, and pumped it across a network share. DU Meter was used to time the transfer. Total time taken was 21 minutes and nine seconds, with an average transfer rate of 27.15MB/s.

By comparison our 10/100 network offered 9.09MB/s. Thus a Gigabit network will not give you 10 times greater performance.

Is this enough to convince the home LAN users to upgrade to Gigabit? Perhaps small LAN parties, where leeching is par for the course, will see some improvements.

Gigabit has its place, but not without the hardware to justify it. When you all have Athlon 64s in your home networks, come talk to us about Gigabit.

SP



Supplier:

PC Range
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Price:

\$179

Sound Blaster Audigy 2 ZS Platinum Pro

Specifications:

DAC: 24-bit/192kHz, 108dB SNR; EAX 4.0; Dolby Digital; DTS ES; external I/O hub.



Creative's Audigy series is unrivalled. With each new iteration, Creative adds a little more goodness to an already tantalising package.

We didn't expect to be disappointed by the ZS – and we weren't. It features the same EMU10K2 as the Audigy 2, so has EAX 4.0/Advanced HD, Dolby Digital and Dolby Digital EX and DTS, as well as a new standard, DTS ES.

In stereo, the DAC pumps out 24-bit/192kHz sound, while multi-channel setups support 96kHz. The software defaults to 44kHz, so it's important to change this. Creative has also upped the SNR, bringing it to 108dB.

The package comes with plenty of kit. Along with the card, you'll find a jungle of cables, a remote, an external hub bristling with connectors, and a mox-to-floppy converter, which provides power to the hub. If this wasn't enough, there's also a quick start guide, manual and of course, driver and application software. To get the most out of the card, you'll need to install the provided applications, as they drive the EAX, sound clean-up and CMSS (Creative Multi-Speaker Surround Sound) capabilities of the ZS.

If you're not into high-quality surround sound for DVD or gaming, then the ZS is overkill. The crisp, clear sound the card produces will put any half-arse speaker setup to shame. As there's a lack of 7.1-compatible DVDs available, we only had a chance to test the 5.1 DVD capabilities of the ZS – they were top-notch.

As for games, we ran through Elite Forces 2 (which supports 7.1 and EAX 3.0), and it's certainly a unique experience, especially with the combination of 7.1 and amazingly high-quality audio.

If there's anything to criticise, it's the fact that with all this newness, there's not enough to sway an Audigy/Audigy 2 owner to dip into their pockets again for the ZS. However, if you're in the market for the complete audio experience, the Creative Audigy 2 ZS is the way to go.

SP





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Picture shown for reference only.



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coolermaster.com

Creative I-TRIGUE L3500



Specifications:

Satellites: 9W
RMS/channel;
Sub: 30W RMS;
Freq. Resp. 30Hz –
20kHz; SNR: 80dB.



We rave about their gear so much, we must sound like Creative fan boys. But they continuously surprise us with new releases so we can't help but gush.

The new I-TRIGUE L3500s are a redesign of the I-TRIGUE reviewed recently, creating an audio experience which changes the way we look at 2.1 speakers.

The satellites are 9W RMS each, house two titanium 1in drivers on the front, and a 1in paper cone driver on the side. Both have their own amplifiers, which throw a wide and deep field of sound. The effect was astounding, leaving us wondering why it has taken so long

to bring this level of audio to the desktop.

To test sound quality, we pumped out a few audio tracks, from hard rock to classical, encoded at 128, 160, and 192KB/s. High tones were clear and detailed, the mid tones rich and smooth and the bass was full and responsive, creating an overall paunchiness that left us grinning. The powerful and rumbling bass is delivered courtesy of a 30W RMS subwoofer, featuring a side throw driver and flared port in front.

There are no controls on the speakers. All operations are through the wired remote, including power and volume. This remote also sports both an auxiliary line-in and headphone socket, as well as a bass level control. Go easy on the bass and volume, however, as pumping it too far will see objects vibrating off desk and neighbours yelling across the fence.

The other new feature is the introduction of the M-Port, which allows your Creative portable audio player, such as a NOMAD, to connect directly to the speaker system, for audio streaming. It will be interesting to see if this inclusion proves popular.

The downside here is the cost. Don't get us wrong, these are great speakers, but \$349 is a lot of money for a 2.1 system. This is one of those occasions, however, where you pay for what you get. And you do get something special here.



Supplier:

Creative
www.creative.com

Website:

Creative
www.creative.com

Phone:

Creative
(02) 9021 9800

Price:

\$349



KLIPSCH Promedia GMX A-2.1

Specifications:

Power: Satellites –
14 W/channel
continuous;
Subwoofer – 50W
continuous;
freq. resp: 35Hz - 20
kHz +/- 5 dB;
THD+N <2%.



The question here, is 'how loud is loud enough?' Surely these speakers from the Klipsch Promedia series, would answer that question. The package screams 'bad arse', from the heavy duty appearance of the satellites, to the bulky beast of the subwoofer. We struggled to find the right words, although 'thumping', 'powerful', and 'nut-rattlingly LOUD' came to mind.

The satellites feature a 0.75in metallic polymer tweeter and a 3in metallic fiber-composite midbass with centre bullet in satellites. Designed with a ball and socket fitting, they pivot and rotate up to 45°.

The 6.5in fiber-composite subwoofer, mounted in MDF casing, has no controls

apart from a master power switch. It houses a 75W amplifier and delivers 108dB maximum SPL. The sub enclosure also has a 'slot' port in the rear, providing a cleaner bass and minimising the sound effects sometimes created by airflow through other port shapes.

A wired control unit includes volume and bass control, and a headphone socket. It also features left and right auxiliary inputs, ideal for console gaming.

Pumping through some AC/DC encoded at 160KB/s, the bass bordered on overpowering, but we were able to roll it back through the control unit. Moving to some techno, we found the high tones were sharp, to the point of harsh. There is no treble control, so we relied on the sound card software to provide equalizer functions. A spoken word audio track was detailed and clear, with no audible background hiss, even at high volume.

We did find, however, that when placing the satellites too far from our personal hearing space (more than two metres) the detail and depth of the mid range diminished. To be fair, this is the case with many personal speaker systems, and didn't detract too much from our overall impression.

Sitting through an hour or three of GTA: Vice City, we continued to be amazed by the clarity and level of detail,



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Innovation Technology
www.innovation.com.au

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SB65G2



New!

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- Intel® Hyper-Threading technology
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SN85G4



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- DDR400 memory, 8X AGP
- SATA RAID Silicon Image 3512
- IEEE1394a, USB 2.0, 6-channel audio
- Integrated Cooling Engine (ICE) technology

Intel® 865PE + ICH5 Chipset



- 400/533/800Mhz FSB Pentium 4 / Celeron CPUs
- Intel® 865PE + ICH5 chipset
- Intel® Hyper-Threading technology
- Dual-channel DDR400 memory (4GB max)
- SATA 100, ATA 100
- IEEE1394a, USB 2.0, 6-channel audio
- 10/100 LAN (Realtek 8100B)

NVIDIA nForce3 150 Chipset



- 800Mhz FSB AMD Athlon 64 CPUs
- NVIDIA nForce™3 150
- HyperTransport™ technology
- DDR400 memory, 8X AGP
- SATA RAID Silicon Image 3112
- FireWire 400, USB 2.0, 6-channel audio
- Intel® PRO Gigabit Ethernet

Antec Minuet

Specifications:

Supports
Micro/Flex ATX
motherboards; two
3.5in bays; one
5.25in bay; side
standing ability;
front FireWire,
USB, line-in/out
pass through;
220W Antec PSU.



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Altech
www.altech.com.au

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Antec
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Phone:

Altech
(02) 9735 5655

Price:

\$143

Also a slow type of dance, 'Minuet' is derived from Old French, meaning 'small and dainty'. To us that's just a blatant misspelling of 'minute'.

Whatever the case, this Micro ATX box is small in a flat, sexy way (yes, flat *and* sexy). With a glossy piano-black finish, this stylish case would look at home in any modern room as a slick home theatre box.

The ability to flip it onto its side is a welcome addition, with two feet that it can slip into. Made from steel, though, this isn't exactly the lightest of all cases, weighing in at 5.7kg on its own.

This is where all the mini-pros fall into bigger-cons. It's all dandy; then you look at the restrictive PCI/AGP low-profile-only design. This superbly cuts down the options, as there really isn't a truckload of decent video cards available in that form factor. *Au revoir* to that home theatre idea.

It comes with a small 220W PSU, but aside from two HDDs and an optical drive, not a lot else is going to fit in here anyway.

On the front, there's a FireWire, two USB and audio pass-through ports, which is just fine, but where in frozen-over-Sahara is the reset button?

There is none. This serious lack of such a respected button is quite detrimental, considering there's plenty of space for it to sit.

A special looking case, but considering you can't put much of worth in the damn thing (even if you have an ex-Compaq computer or two); money would be better spent on a superior, albeit more expensive, barebones mini PC.



Cooler Master Jet 7

Specifications:

Socket A
heatsink/fan; 3.5in /
PCI bay fan speed
control; maximum
3,500rpm; minimum
1,700rpm; weight:
400 grams.



The new Jet 7 appears to have been ripped off the side of a Learjet, shrunk and screwed onto a heatsink. Cooler Master's horizontally mounted design adds to the appearance of a blatantly sexy plane part. Additionally it features a red LED on the back and a flashing blue LED which screams 'Jet'.

When attaching, a problem arose – this is comparable to a single human

arming a ten-person catapult. A flat-head screwdriver is compulsory if you cherish sanity.

Once we finally had it running, sitting at a peak of 3,500rpm, the only sound heard is air being sucked – no screams, just an acceptable level of high-speed air.

It's very similar in features to the Aero 7, save for looking like it's ready to take your PC for a hell-ride. That aside, the two primary differences are the aluminium fins with a copper base and a slower max fan speed (3,500rpm, compared to 4,500rpm). As the Aero 7 is one solid piece of skived copper with a faster fan, theoretically it should perform better.

Well it did just that. In an ambient room temperature of 21°C, setting Chernobyl to the usual 80W, we retested the Aero 7 on full speed, and it returned 49°C. When we fired up the Jet 7, it spat out only two degrees higher, reaching a still respectable 51°C. This is impressive for a significantly slower, quieter fan.

Ignoring the nasty clip, with a noise factor far below that of the Aero 7 with only two degrees difference, this baby is not only guaranteed to *not* detonate ears, but will also generate wads of fear from your peers.





australian game developers conference

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AUSTRALIAN GAME DEVELOPERS CONFERENCE 2003

20 - 23 NOVEMBER 2003 MELBOURNE CONVENTION CENTRE AUSTRALIA

Featuring (in order of appearance)



Ian Livingstone

Creative Director, Eidos Interactive UK

Come along and hear Ian Livingstone speak about the benefits and strengths of European publishers and why Australian developers should look to Europe for publishing partners.



Ian Fischer

Lead Game Designer, Ensemble Studios, USA

Ian Fischer will discuss the fundamentals of the "Iterative Development Process" used by Ensemble Studios to produce games of commercial success.

He will also share the lessons learnt from its application and explain how it may improve your own development process.



Seamus Blackley

VP Development, Capital Entertainment Group, USA

Pundits predict consolidation, publishers flock to licenses, and developers quietly go out of business... times seem scary. Seamus Blackley frequents both sides of success, and has learnt one lesson that applies to everyone who loves games, but is starting to hate the games business. Attend this keynote session to hear Seamus reveal the answer.



Phil Harrison

VP Development, Sony Computer Entertainment Europe

Take a front row seat in the Latrobe Theatre at 4.10pm on Saturday 22 November and be privy to the insights Phil will be sharing with us...



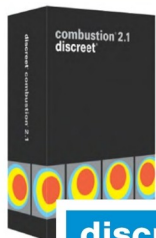
Laura Fryer

Director, Xbox Advanced Technology Group (ATG) Microsoft Xbox, USA

Learn about the changing technological landscape and hear Laura Fryer discuss practical insights, predictions and illustrations applicable for all genres and both PC and console games. She will also provide relevant examples from present games and technology that will guide your team to a successful future.



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"Transgression" by Andrew Mc



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GAMES



D&D lite

Logan Booker, wielding an axe of alliteration, confronts the army of sub-standard CPRGs.

Gamers have never been starved of D&D computer RPGs. If anything, there's been so much choice that any die-hard pen-and-paper adventurer would explode like Mr Creosote from *Monty Python's The Meaning of Life* if they ever tried to experience them all. Strategic Simulations Inc was responsible for a vast number of D&D titles including *DarkSun*, *Eye of The Beholder* and the *Pool of Radiance* series, and it did a fine job of bringing the dragons and dungeons to the digital world.

There have always been compromises though, and mostly not small ones. Any sleight-of-hand performed during the conversion in an attempt to hide the fact you were not playing authentic D&D usually came off as a bright, red and gold firework in mid-combustion.

In the age of memory limits and four-colour displays, it was easy to excuse the lack of more than a few monsters from the D&D *Monster Manual* in the first *Pool of Radiance* game. Sacrifices are made for the medium to suit the medium.

As computers have matured, so has the quality of games. Throughout the nineties there was a steady stream of D&D games, each one progressively better than the last. It wasn't until about 1998 though, when Interplay published *Baldur's Gate*, and SSI dropped off the radar, that things took a turn for the different.

Baldur's Gate was really the first mainstream D&D title. BG was based on the 2nd Edition D&D, and it opened a whole new world of RPG gaming to closet adventurers. *Neverwinter Nights*, while based on a new engine, was a descendent of this 'old great'.

Neverwinter Nights was a giant change in focus. Rather than make a pseudo-D&D adventure (*à la* BG), *sorta-kinda* based on pen-and-paper, BioWare decide to go all out and implement as much '3rd Ed' as it could, and market the game as such.

Well, kinda-sorta.

For example, it's easy to tell BioWare never planned on *NWN* being an NPC-fest – that's why there are hardly any

knowledge skills. You can also see that BioWare wasn't impressed by the whole 'randomness' associated with stat dice-rolling, and used the point-buy system instead. Things start to add up, and it gets easier to see that BioWare skipped more than a few pages of the *Dungeon Master's Guide* and *Player's Manual*.

D&D has evolved over almost two decades. It's been carefully tweaked and modified to keep it fresh and balanced. It only takes one game developer to start tossing things out to ruin the gameplay. Didn't you think it was a bit odd that you could sleep pretty much anywhere, or summon your familiar, on demand, once per day? Aren't familiars supposed to be lifelong companions, whose death has a significant effect on the player? Don't they have to wait 101 days before they can summon a new familiar?

Nope, not in *Neverwinter*.

Now we come back to the topic of compromise. Obviously, you can't have a true-to-life conversion of D&D on computer. D&D does have one thing going for it, thanks to those twenty years of long service – a well-rounded combat system.

Snatch and grab.

The simple fact that a lot of D&D adventures can contain zero combat instantly rules out the system, unmodified, as a candidate for a video game. Who wants to play a title where no one gets beat up? This reason alone scares publishers away from any game that relies on talking, and most gamers wouldn't put up with that sort of experience. We've been bred not to.

There are those that would, but they're *far too niche* to be of concern.

Their salvation is *Troika's Temple of Elemental Evil*, which went gold a few weeks ago.

The game's about as D&D as you can get as far as CPRGs go. . . kinda-sorta.

There are still no knowledge skills nor multiplayer (which D&D lives on) and you're limited to 10th level, but you can't blame *Troika* – it's done a bang-up job with its 18 months. . .

LB

SHORT CIRCUITS

◀ Developer Mayhem Studios is currently working on a fantasy RPG title called *Neverend*. Don't worry if you haven't heard of them before, they're based in Slovakia. So, why should we be interested? Well, graphically, it's looking fairly sweet, and Mayhem promises non-linear gameplay along with a dynamic magic system. It should be with us in 2004, and if it sounds like it might tickle your broadsword, visit www.mayhem.sk.

◀ We all remember the good doctor right? You know, Dr Derek Smart PhD? Well, it seems his latest *Battlecruiser* iteration, *Battlecruiser Generations*, has undergone a name change to 'Universal Combat'. We get the feeling that maybe Derek has lost a little creative control over the project and given publisher DreamCatcher some leeway. Apparently the game is more action than strategy, so maybe the new name might give it more selling 'oomph'.

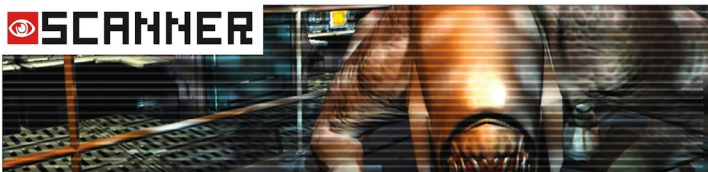
◀ Well, *Half-life 2* has been delayed... officially. It seems Vivendi and Valve are finally in agreement, which can only be a good thing – for them at least. For us, we'll be watching the horizon for 'holiday 2003', as our ship sails ever onward to December.

BUZZWORDKIAN:

Alpha version

The definition for an 'alpha' version of a program is fairly straight-forward. Basically when a developer compiles a project and releases it for testing internally, it's alpha. Alphas are also good for getting feedback from select external parties (such as a graphics company), without having to worry about complications with missing features – they're not expected, so there's no problem.

SCANNER



id's confession

No matter what's said, *Doom 3* will still be a tremendous gaming milestone. Logan Booker had the chance to pick the brains of id's gods.

While the hype over *Doom 3* has lessened over the years, thanks to the development (and imminent release) of titles such as *Half-life 2* and *S.T.A.L.K.E.R.*, as well as the title's unexpected delays, the gaming community is still in never-ending seizures over the graphics, gameplay and content.

A couple of weeks ago, *Atomic* had the opportunity to catch up with id Software's CEO, Todd Hollenshead, and designer Tim Willits.

It was certainly not a chance we were going to waste. . . so taking out the alligator nipple-clips and the portable sub-station, we set about obtaining answers to our perilous questions.

We started off by asking Todd about *Doom 3*'s delays. Although he couldn't give an exact date, he made it clear that id was dedicated to getting *Doom 3* done.

'We really just don't know . . . it should be next year. Typically, we have a good idea when we're two months out, and as soon as we get there we'll let everybody know. It's our job to make the game great, as opposed to just hitting some arbitrary date. So it'll be done, as we say, when it's done.'

Considering all the heavy optimisation being done for the pixel shader code paths and on the engine itself, we were curious as to how the delay would affect the progress of these. We asked Todd how the product cycles of NVIDIA and ATI would impact *Doom 3*.

'Actually, we will [have to optimise the engine]; [however] because of the way John writes the engine – he writes [it] in the OpenGL standard – he's not specifically coding for one – ATI or NVIDIA.'

Todd also mentioned that John Carmack had a good relationship with NVIDIA, so he's on the ball when it comes to the release of new products or features.

'John absolutely knows not only what their product cycle will be for the next six months but probably for the next 12 months and 18 months – 24 months,' Todd said.

Todd also mentioned that the benefits of John's relationship extended beyond product release dates:

'One of the great things for us is that having such a great relationship with those guys is that, not only do we know what they're doing, but he [John] actually gets input into their process and gives them directions that he thinks they ought to take.'

Todd said that NVIDIA was willing to do what it could to help *Doom 3* look and run better.

Alphas and AI

A wandering thought about the alpha leak was that it might have been a partial cause for the game's delay. When we asked, both Todd and Tim were quick to refute.

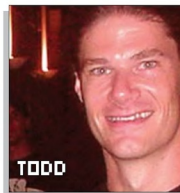
'We literally put no creditability into anybody's opinion that might form from that [the alpha], because it was never intended to be something that was representative of the game,' Todd said.

'John probably said it best when he said that any opinion formed on a non-interactive, unintended leak of a PC game . . . makes it sort of invalid on its face,' he said. 'The only thing you could argue that it created any issue for us was it was a pain in my ass for about month as I had to deal with it.'

Tim was also adamant about the reasons behind the delays; that they had nothing to do with the alpha or anything else – just the simple fact that id wants to do the job right, considering the technology the team is using.

'You know, the thing is with the cutting edge technology that we're working with here, we have nobody to follow; we have nobody setting a precedent here – we are out front,' Tim said.

At this point we should mention that we had a chance to see actual *Doom 3* gameplay. Tim took the controls and guided us through a small section of the game. It was a good opportunity to see how all the game's elements came together; physics, graphics, sound and AI.





During the game, we saw quite a few scenes where monsters would burst out of doors or drop from above. We were confident that they were mostly scripted sequences, but we decided to ask id if players could expect any variation or randomness with these scenes.

Todd put the emphasis on dramatics – Doom 3 is a story, and id wants to have control of that story. According to Todd, the best way to accomplish this was to have scripted sequences. For instance, during the presentation, a creature named 'Pinky' drops from a balcony, breaking down railings and negotiating its way to the player, who is conveniently stuck inside a room with only one exit.

'... those are scenes that we set up for people to experience,' Todd said. '... there will be elements like that throughout the game. The scene with the Pinky demon for example, that's actually ... how we do character introduction.

'It's far more dramatic if we get the music playing out and you put the camera around you – [you] have a very dramatic scene ... and hopefully scary for people when they play the game,' Todd said.

Drop it in

With the preliminaries done, we cranked up the juice on the 'gator clips and got into the meat – Doom 3's engine. Tim broke down first.

'Well, the great thing about John Carmack's graphical engine is because it's so robust ... [the physics engine] fit in so seamlessly and it integrated well ... that's why you can't tell if this barrel is going to fall down on you or if this wall is going to crack open.

'For instance, the breaking glass; John had made glass a long time ago, and then we added the physics elements on top of it and it just worked ... it's really a testimony to John's abilities to make a solid, robust graphics engine.'

Considering id, when it started developing Doom 3, was indeed at the forefront of using advanced pixel shaders and the like in a game, we were interested as to how the team got its head around everything. Todd summed up the situation at id for us.

'... there's like the R&D work on the technology [phase] and then

there's the 'figure-out-how-to-use-it' [phase] and then there's the actual 'implementation-into-the-game' stuff. ... there's a fair amount of time that goes into the guys creating test stuff, time to be able to test aspects, the R&D phases, there's sort of learning the technology cycles – that I guess can arguably be part of the engine development as well,' Todd said.

With the success of Quake 3's licensees, there was little doubt that id's prepared for developers wanting to use Doom 3's technology. Todd was happy to expand on the details.

'Our approach to licensing is we want to provide licensees with everything they can have of ours potentially to succeed ... [from] a technology standpoint ... we want to give them every advantage, so they get ... everything we own,' he said. Todd said that by 'everything', he meant the lot.

'... it's not only the PC stuff, but we're working on an Xbox version as well, and they'll get that too. ... it's been very successful for us in the past [and] very successful for our licensees. I think you can probably look at Medal of Honor and Half-life as the two most successful titles of all time that used licenced technology [from id].'

Benchmark competition

With both Todd and Tim begging to answer questions, we couldn't pass up asking about the competition – Half-life 2, S.T.A.L.K.E.R, Far Cry and Chrome. Tim took the lead.

'We are game players at id. We would be very sad if there were no fun games in the world ... it's really a great time for games on PC. And it just proves that PC gaming is alive and well.

'It's not like the other games are required to suck in order for our games to be great. We're looking forward to a lot of those games ... [and] those guys working on those games are looking forward to Doom 3.'

Benchmarks – there has yet to be a Quake game that hasn't been used extensively for its performance-testing capabilities. With the sub-station pushing the ozone envelope, we put our final questions to Tim and Todd.

'Historically John's always added some good counters and graphs into the engine and, of course, Doom 3 will definitely be used for benchmarking tests ... Doom 3 is one of the few games in development now that [can bring out the] full potential of all these [video] cards,' Tim said.

Todd was also certain that there'd be some solid benchmarking options available in Doom 3, as well as diagnostic tools useful to chip manufacturers and game developers.

'It's important ... [to have these options] to help the hardware magazines evaluate video cards, but also ... [so] we internally can evaluate the video cards and so that the video card manufacturers can use those options for their own products ... and see where they have slowdowns or [need] optimisations - maybe there's something broken within the game. Although that's typically the exception; [it's a matter of] whether they're going to fix it, or will we have to write a workaround.'

End game

As we packed up our burnt-out sub-station, we asked what id would do if they had access to 1,000 times the resources.

'If everybody in the whole world had a couple of gigs worth of RAM, we could have like one map,' Tim said.

When asked why, Todd let us know that Doom 3 would probably need two CDs minimum, though chances were it'd be on four.

'That's one thing we're not going to sugar-coat,' Tim said. 'It's going to take a lot of disk space.'

So, what have we learned? Doom 3 will be a success, no matter what. How much of a success will depend on how id pull off a 'story-driven' FPS, something that we've only seen done well with RPGs such as Morrowind. Perhaps the 'survival-horror' gameplay will appeal to more than just gamers. We'll find out some time next year.

Thanks to Activision for providing us the opportunity to interview Todd Hollenshead and Tim Willits.

DEVELOPER QUOTE OF THE MONTH:

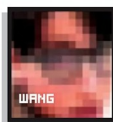
Fundamentally, your chief competitor for any of your games is your own game, except it's made by someone who is just stealing from you. That's a pretty big problem.

Todd Hollenshead, on piracy in the games industry.

THE ENGINE ROOM



Homeworld 2



James Wang takes a look at the cleverly pretty graphics in Homeworld 2.

For one reason or another, people tend to relate the concept of a graphics engine solely to the first person shooter. Although strategy and space sims are now also at the forefront of graphics, the fact that the latest advancements always occur in FPS gives the impression that anything else is taboo. Homeworld 2 is the counter image to this impression. Its engine, designed purely for scale, follows few of the set rules which we've taken for granted. More than anything else, it shows that graphical superiority isn't gauged purely by the feature list, but through clever design and unique styling.

Bigger is better

In first person shooters, we lust over detail. We want to see every single pore, hair and scar rendered to perfection. This has led to graphics engines that concentrate single-mindedly on local detail, but scale rather poorly when it comes to size and unit count. In space however, size is all that matters. Josh Mosqueira from Relic Entertainment puts it best: 'The most prominent thing about space is that it's big. With FPS or standard RTS engines you are controlling things that range from the size of a man to the size of an elephant. Basically everything is roughly the same scale. In Homeworld 2 you have small fighters that could be vehicles in an FPS, all the way up to giant ships the size of an entire level in other games! One challenge is to make colossal structures and tiny interceptors visible at the same time while still conveying the sense of scale to the players.'

Homeworld 2 not only has enormous units, but also has a lot of them. It doesn't try to take your breath away with microscopic details but rather with its



sheer scope of vision: 'In Homeworld 2 it is possible for up to six players to bring together hundreds of ships with an incredible range of scale. The graphics engine has to be able to cope with a super high unit count on screen with an obscene amount of special effects.' These limitations mean that given a set amount of graphical resources, small ships will need to be fairly simple and efficient to draw, in order to guarantee a sustainable frame rate when the battles become heated. But the final appearance of these vessels is far from simple, 'one of our goals for Homeworld 2 was to have highly detailed ships. In addition to having as many vertices as possible, while still being playable on our min spec T&L cards, the most essential part for this is to have highly detailed textures.' If hundreds of ships are engaged in a fire fight, large use of

↑ ABOVE: Fast to render and highly additive to watch, the re-memorising interceptor trail is the trademark of Homeworld.

complex shaders is out of the question. Normal (dot3) mapping may look great on one character, but if applied to the entire fleet, the engagement will probably grind to turn based speed. The problem is how does one create epic scale and enormous quantities of detailed units?

Homeworld 2 has taken the most sensible route of massively applying classic graphical effects. Shaders may be expensive, but texturing is cheap, 'when artists create a Homeworld 2 texture in Photoshop they create a base layer, a label layer, a glow layer, a specular layer, a team base and stripe layer as well as an optional badge layer,' Josh explains. In essence, to tackle the



↑ **TOP:** Simple solar effects have never looked so good. Notice the fainting of trails due to the star's brightness.

↑ **ABOVE:** Star Wars scale battles were the target when Relic began producing Homeworld 2. To enhance the visual appeal, battles are backstaged against nebula and planets instead of empty space.

difficulties of achieving both scale and detail, Homeworld 2 bypasses the latest shader gizmos and instead massively applies multiple, detailed textures while pushing geometry to the limits.

Shadows of space

Even for a space RTS, accurate shadows are still essential for maintaining immersion. Stencil shadows would be most unsuitable as the complex geometry and high light count of Homeworld 2 would chew through enormous fillrate. To cure this problem the shadow map technique is used instead. This technique is generally more suitable for outdoor and large areas. This algorithm scales linearly with additional geometry and has a much lower constant cost in shadow generation than stencil shadows. Shadow maps use a common rendering technique known as 'render to texture'. In this case, the game is rendered from the view of the light and this view is

stored in the 'pbuffer'. The pbuffer is like an alternate frame buffer where rendered frames can be stored. Think of it as taking a screenshot of the game from the viewpoint of the light that's casting the shadows and using this information to decide which areas are lit and which are occluded. Even using shadow maps, shadow generation is still the most expensive graphical feature in Homeworld 2. Disabling it yields some interesting results, 'If you have shadows disabled we generally found Homeworld 2 to be geometry bound, especially if you turn up the lighting detail. The cool thing about being geometry bound on many cards is most cards can switch to very high resolution and turn on anti-aliasing without lowering their frame rate!'

The real visual treats however, are in the battles; once the opposing fleets engage, the entire scene is literally bathed in hundreds of special effects. The interplay of sweeping interceptors, mammoth capital ships and particle effects gives the whole game a visual sense that is rapid, dynamic and often cinematic. 'Beams and particles are rendered as textured polygons as well. Many of them use animated texture coordinates,' says Josh. Clever use of art and resource saves the day again; by keeping the technology simple, larger scale and quantity is achieved.

Random beauty

The choice for hand crafted art versus procedure generation is one that every developer now has to face. Procedure shaders, which are heavily pushed by ATI and NVIDIA, have the advantage that they require no texture input. By their own nature, they can generate useful effects from random numbers. The result is wonderful for cell shading, material simulation (nebula, planet terrain) and anything which is naturally occurring. But with this wonderful property comes the lack of control, 'one catch with procedural art in general is it is sometimes difficult to find the look you want,' Josh explains. 'If you are trying to simulate reality, procedural art can work pretty well, as you can borrow from formulas that characterise it, but when you are trying to simulate "something really fricking cool" then you really need an artist's influence.' Artists of course need the right tools to do the job, which is something currently lacking, 'future generation games will continue to move towards procedural shaders, but it appears at this point the hardware is advancing faster than the tools for the artists.'

The art direction of Homeworld 2 retains the style and feel of the first game. The trademark fighter trails of the first game makes its appearance again. The new trails are now blue hued with a soft glow that puts the solid edged streaks of the first to shame. Using the new camera to pan and track your fighters as they engage the enemy is like directing your own movie; slickness and cool-factor, I'm relieved to report is retained. 'The key is to have all three departments – art, design, programming – work closely together, all sharing the same vision. Homeworld 2 is a real collaborative effort, and this directly contributed to creating a game that has its own unique style and look,' Josh concludes.

Homeworld 2 was made under the motto of 'evolution, not revolution.' Graphically it does not pretend to be the latest DirectX 9.0 tech demo. If it did, it would be a shame, for none of us would have the machine to see a full battle unfold. It has taken some very sensible paths in its engine creation. The end result, when unleashed in action, is nothing short of a visual feast. Let's hope we see more examples of clever design over fancy graphics in the future.

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Space Colony

Ed Dawson likens Space Colony to an interactive Red Dwarf – a fusion of Starcraft and The Sims!



↑ If you live under a flight path and aren't happy - consider how the citizens of the future suffer.



↑ Pesky space rodents cop a face-full of laser. "Get the truck outta my base, Amoeba-face!"



↑ Space Colony plays just like the wonderful Startopia of a couple of years ago.

Hothing to do with Colonic Irrigation, Colony Wars is all about managing the lives and operations of Space Colonists. Sent onto hostile and treacherous rocks by the murderous and capitalistic 'Space Corporation', you must survive a series of mini-dramas similar in setting to *Aliens*. At the same time, you'll have to deal with polar personality clashes akin to those in *Red Dwarf* – as well as maintaining a fragile network of structures under constant attack. Space Colony's strong links to these spearheads of pop culture is a fun thing.

Space Colony is a hectic experience. As Venus, the experienced Space-Babe Project Manager, you must run a primary resource business while also waging war on aliens – rushing along a tightrope of expectations and threats, as well as managing people at a micro level à la *The Sims*. This kind of fusion is a new thing in gaming – it's weird to go from dealing with someone's urgent need to take a shower at one moment, to placing heavy laser guns at the next.

Personality plays a large part in the dynamics of Space Colony. Each character in your crew has their own likes, dislikes and hierarchy of needs that must be maintained to ensure they do their jobs. Some of this mirrors a Sims-like system, with relationships balanced up as the sum of positive and negative experiences. This layer of cooperation and productivity is the foundation of all other actions in the game. Relationships can be managed by viewing each character's political status and heading off discontent by making them sit down and work out their differences. Yet, just like reality, when external factors force you to push people beyond their usual comfort zones, niceties go out the window.

Relations rapidly break down – you can hear little audio outbursts from characters making their feelings known.

The structure of the living space is also your responsibility. You must build new modules and place them in the landscape similar to *Starcraft*, with consideration for recreational, military and resource effectiveness. Of course, you must balance the colony finances while you are doing this and expand operations as necessary. Occasionally you will receive extra personnel. While the added work they do is valuable, your job gets more complicated as they add potential for personality clashes and discontent. You'll constantly be juggling staff roles to keep the base's core stocks of power, oxygen, food and money afloat. An unexpected aspect of the game is the new-world psychology belief that when people are happy and have all their needs catered for, they will work harder. In fact this is modelled directly into the game, with happy people literally allocating more of their day's clock time as work, in proportion to their happiness level.

So, landed with a whingeing and incompetent bag of bad-tempered turkeys, you are given steep time limits for resource collection and thrown into lethal battle with vicious creatures who live on top of extremely valuable mineral stocks or both. You do this pitted against a raft of interesting alien monsters – around forty different kinds with multifarious behaviours and forms. You'll never quite get to Siege Tanks though, as your entire world is usually contained within a short walking-distance. Besides which, you couldn't possibly deal with many more of these unruly employees/soldiers at once. At least, not without some sort of 'bitch-slap' option. Of course, you have to do the right thing by

counselling people, paying attention to them and making some attempt to solve their grievances. Playing games like this will give you new respect for managers in every profession.

Space Colony has quite a short single-player campaign, however, you can create your own levels with an included editor, and download other people's scenarios off the Internet. Essentially, Space Colony is fun and interesting with extra appeal for those who enjoyed *The Sims*. **ED**

Developer:
Firefly Studios
www.fireflyworlds.com

Publisher:
Gathering of Developers
www.gathering.com

Distributor:
Take2 Interactive
www.take2interactive.com

Phone:
Take2 Interactive
(02) 9482 3455

REQUIREMENTS: XP3
800MHz processor;
64MB RAM; 4MB
video card.
RECOMMENDED: P4
equivalent or better.
128MB RAM, 32MB
video card.



Quirky, cute, funny game with really brain-twisting problems.

It's one of those irritating games where the characters constantly complain.



7 10

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Official Star Wars® Web
Site www.starwars.com

WWW.LUCASARTS.COM



Republic: The Revolution

George Soropos tries his hand at winning over the masses.



↑ 'Two boiled pigs trotters, shredded cabbage, dripping and dried carrot tops on a black bread bun'.



↑ Advanced 3D physics allow this pole to realistically cast a shadow. Yeah, good one Demis.



↑ 'Comrades! Never again will we bend to the will of the Publisher. It is the People's Game!'

With bean counters reigning supreme in game publisher's boardrooms, new ideas don't see the light of day very often any more. Republic: The Revolution looked like being one of these rare birds. Demis Hassabis, designer of 'Theme Park' came up with the idea for Republic a long time ago and has been working on the project for about four years. However in the end it looks as though Eidos executives got to it, and what's left is a watered-down version of the original concept that more closely resembles Eidos' earlier 'Gangsters' games.

The game places you in charge of a small dissident faction trying to take control of a tiny former soviet republic called Novistrana. Your main character has a range of abilities depending on your preferences and his experience level, and you can recruit others to your cause to add new skills to your repertoire. These include passive abilities such as investigation and surveying to gauge the mood of the people and find out what other factions are up to. There are also more aggressive skills such as charming, bribing and assaulting other characters around town.

The hype surrounding the game has boasted about its 'Totality' engine which has the capability of rendering an infinite number of polygons to create a very realistic game world. The 3D looks very nice, even with a maximum res of only 1,152 x 864, however it's basically an event viewer. There is very little interactivity between you and the game when you are in 3D mode, some political actions allow you to choose the type of message you want to give to the people in order to tailor it to their particular tastes and that's about it.

If you have played either of Eidos' (or should

we say Atari's) Gangster titles you will be familiar with how Republic works. All of the gameplay occurs on a 2D map of the city where you plan the actions of your faction members up to three turns in advance. Turns are basically the different times of the day, morning, afternoon and night, and flow without pause. While the game goes on other factions will vie for the sympathies of the people and you have to approach the right ones with the right message to win them over. The game throws specific goals at you to keep you going in the right direction and there are usually a few different ways to go about achieving them. As your characters succeed in their actions they go up levels. Planning what skills to improve when your fellow conspirators do this also determines a lot of what you can do with them later. This abstract way of influencing gameplay is another uninspiring aspect of the game's design.

Even the 'Gangsters' titles gave you some direct control in the animated part of the game, letting you drive them around and shoot things up. Republic is a pure strategy game where you make your plans and watch what happens. You will spend virtually all your time working on the 2D map as even the most action oriented events in the 3D world eventually become too dull to bother watching, leaving the unanswered question 'why did they bother with such a technically advanced 3D engine?'

This is not necessarily a bad thing, hard core strategy buffs probably won't mind much, but for many the gameplay will quite likely be disappointing. After a few days' organising, planning and scheming the game starts to slip into a monotony of routine which sadly seems more like work than fun. Even though there are over 200 different actions useable by your

cohorts they all fall into two basic categories: gaining support or undermining your opponent.

Republic: The Revolution was an idea with a lot of potential that's been neutered in order to keep costs down. Whether that's the developer's fault for taking too long or the publisher's fault for being too impatient we may never know, but a good idea has gone begging, and God knows there are few enough of them in the games business these days.

GS

Developer:
Elixir Studios
www.elixir-studios.co.uk

Publisher:
Eidos
www.eidos.com

Distributor:
Atari
www.atari.com.au

Phone:
Atari
(02) 8303 6800

REQUIREMENTS:
PIII 800MHz,
512MB RAM,
32MB video
card, DX 8.1
audio
RECOMMENDED:
P4 2.8GHz,
1GB RAM,
128MB video
card



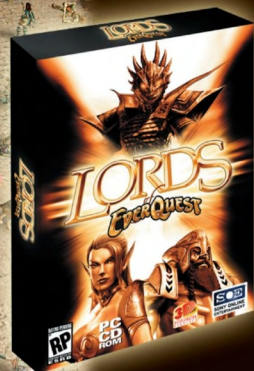
Original idea, attractive 3D engine, blokes named Boris.

Not much interactivity during 3D sequences, execution of the game concept a bit too similar in format to Eidos' 'Gangster' titles.



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"Lords Of EverQuest wants WarCraft III's head on a plate."

- PC Powerplay October 2003

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Mace Griffin: Bounty Hunter

Ed Dawson likes hanging out in Space Taverns drinking unidentified blue stuff.



⬆️ Nothing new combat-wise; if you've played any other FPS, you've played Mace Griffin.



⬆️ Oh yeah. Spaceflight. Look at all those pretty asteroids. Except that one, on the right.



⬆️ This is Dawson. According to your objectives, you have to meet him. Well... we've met him.

Mace Griffin: Bounty Hunter is a straightforward first-person-shooter release along the lines of Red Faction, fused with arcade spaceflight combat, as found in Star Wars: Starfighter or Starlancer.

Mace Griffin, a grizzled and dishonoured ex-Space Police dude is your avatar in this title from Warthog Games. Sent to jail for being the sole survivor of a covert alien attack, Mace has a big chip on his shoulder and an enormous motivation to maim and injure people. Lucky for him, on release he's thrown straight into the violence-filled world of illegal space bounty hunting. With the voice of Henry Rollins, Mace is all set to kill millions of his random enemies and find a way to clear his name. This is where you come in.

In first person mode you get to run at the objectives and shoot everything. In this regard it is possibly one of the most derivative game worlds we have ever seen, heavily borrowing elements from Halo – but without the same groundbreaking AI. You'll endure many cargo holds filled with generic 'Space Crates', and carry out numerous jumping puzzles on the crates. Then you'll crawl through a ventilation duct and repeat. It's not all bad news though, as the weapons are nicely created and bullets have an obvious 'flight time' that forces you to lead your targets at range. You can also hit enemies in the head for an instant kill. Our main problem is that unlike Red Faction, Mace Griffin doesn't seem to have anything new to bring to this samey world of corridor and landscape combat. This lightweight rehash of tired game concepts will likely irritate veteran first-person-gamers.

However, Mace's story and setting have

been quite well developed. An early mission sees you infiltrating and gunning down everyone within a flying temple filled with religious zealots. These characters have submitted their will to their central computer, à la Star Trek's Borg. A result of this submission is strange wiring attached to their heads and a low-res flat screen mounted over their faces, which displays a perpetual icon of a smiling face. When you shoot them, obviously, it stops smiling. Comic touches like this help to alleviate the round-robin of samey action which you'll be playing through. You follow a pretty linear path through missions offered by various Space-Barons and kill all different manner of Space Baddies for cash.

The really cool part about Mace Griffin is the spaceflight combat. This element of the game is really well presented. You'll use heavy laser guns at long range and tricky bullet-strafting miniguns at short distances. You'll follow enemy ships until they're locked, and blow them up with missiles. Of course, most of this is standard fare for arcade style spaceflight games. So far so good. The amazing part in Mace Griffin is that during all of this space action, you can actually walk away from the cockpit and take a stroll around the ship, go downstairs, look out the windows, watch the action, enjoy yourself. The transition between these worlds is better than instant – there is actually no transition to speak of. We are excited about this, even though it doesn't add anything functional to the gameplay. It would have been cool if you could have been running back with a fire extinguisher and managing fires or damage created by a missile hit. Later in the game you get to pilot enormous cruise liners, although the controls

don't change much.

Although we've taken a quite few shots at Mace Griffin, there's no particular element that we could single out and label as being obviously 'bad'. It's more that a greasy layer of mediocrity and 'copy-cat' features infuse a big percentage of the game. The cool spaceflight sections are much better and do a lot to compensate, although the game certainly isn't in the 'triple-A' category. For a knockaround action experience, Mace Griffin is a bit of fun. But, purists should steer clear.

ED

Developer:
Warthog Games
www.huntthemandown.com

Publisher:
Black Label Games
www.blacklabelgames.com

Distributor:
Vivendi
www.vivendiuniversal.com

Phone:
Vivendi
(02) 9978 7722

REQUIREMENTS:
P3 1GHz processor;
64MB RAM; 32MB
TNL video card.

RECOMMENDED:
P4 or equivalent
processor; 128+MB
RAM; 64MB TNL
video card.



Quick and accessible first person shooter and spaceflight game.

Painfully derivative pedestrian sections will get on your nerves.



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90 YEARS LATER IT HAS FINALLY BEEN DECIPHERED.



BROKEN SWORD

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THE ADVENTURE BEGINS WHEN THE MYSTERY IS SOLVED



PlayStation 2



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Age of Wonders: Shadow Magic

It's been an age, and Chris Booker has yet to find any wonders.



↑ Firey explosions dominate the landscape from time to time. Make sure they're yours.



↑ The Masters of Magic-style combat is a nice addition, but it doesn't quite pull it off.



↑ We think they're elemental. It's not out of the question that these are just pretty effects though.

Wizards are the people to know. They can do house chores with a click of their fingers or rain flaming death on your neighbours by doing nothing more than stringing together a bunch of random letters. Sometimes however, they'll put on a show and draw circles on the ground, throw stuff in the air and call on dark gods to separate the recycling.

Age of Wonders (AoW) is of the latter persuasion. It looks great at first glance, but after a few weeks of having to go through the same ritual over and over, you'll start to wish they'd go back to clicking their fingers.

The easiest way to describe AoW is a cross between Heroes of Might and Magic and Masters of Magic – for those of you old enough to rememberSSI's fantasy strategy. You move your units around the game world, searching ruins and claiming structures such as mines, which produce gold to fuel your war machine, and towers that increase your view. While your heroes and their followers are doing this, you're at your tower researching and casting spells to help them, or hinder your foes. Holding onto your structures while capturing your enemies is the crux of the game, and you must balance between expanding too slowly and getting outstripped by the opposition, or spreading too fast and leaving yourself spread thin, though in this turn-based strategy, it's more about how many units you have, rather than how strong they are.

Each wizard's spells are restricted to the school of magic they study. There are a number to cast, but in combat the differences between them are slight; a water spell cast against a fire creature will inflict extra damage

– and that's about it. You can also gain skills that will allow you to decrease the delays associated with production and research. The magical effects will demand the most from your video card – not that it's much – as you set fire to enemy units and watch them burn, or cast blue lights that cause the lands around your tower to flood. The unit graphics seem a little out of place in this day and age, though there are a few touches that make them nice.

The awkward interface makes itself apparent from the word go, as it requires very precise clicking. One mis-click and your unit will march past its intended destination, wasting a precious turn, or cancel your production, putting yourself a few turns behind schedule. Trying to get your groups to move to an exact spot is tricky, as it's sometimes difficult to tell which hex your target is on, and as far as we could tell there's no way to make the hexes visible.

Shadow Magic also demands that you continue to move your units manually each turn; that is, you can't set a final destination and expect them to make their way there turn by turn. In a game where unit movement is pivotal, it quickly becomes tedious.

The 'Quick combat' system is also flawed. Out of every 10 quick combats we entered, our hero died in about four, even when we had overwhelming forces. This requires you to manually do every battle (to assure a victory), which drags out the game even more.

As for game types, there's the traditional campaign, skirmish and multiplayer modes, though the campaign mode feels more like a bunch of scenarios, with a story that you follow rather than it carrying you away. The story doesn't proceed until you meet a certain

condition, like going to a map point, and because you may take an hour getting there, plot developments are detached.

Age of Wonders: Shadow Magic is an average turn-based strategy. It's fun to play, but doesn't flow as easily as Heroes of Might and Magic. If you're a fan of the genre, then it might be worth checking out, though there isn't really anything new, except that it looks nicer graphics-wise than its predecessors. It won't keep you up until 3am, but it will burn some hours on a Saturday afternoon.

CB

Developer:
Triumph Studios
www.triumphstudios.com

Publisher:
Take 2 Interactive
www.take2games.com

Distributor:
Take 2 Interactive
www.take2games.com

Phone:
Take 2 Interactive
(02) 9482 3455

REQUIREMENTS:
450MHz CPU;
128MB RAM;
16MB video card;
900MB HDD

RECOMMENDED:
900MHz CPU;
192MB RAM;
32MB video card



Solid turn-based strategy, good learning curve, spellcasting.

Nothing new, annoying interface, disjointed story.



6.5 10

WARLORDS IV

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PC
CD
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Fantastic Dan's miracle cures

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IOOTM:

Predictably unreliable

My PC keeps resetting for no reason. It doesn't shut down or anything, it just resets like hitting the reset button.

I've got a feeling it's a software problem, but I'm not sure. It only does it when I'm actually using the PC – if I'm away from it, it doesn't do it.

Also, I'd like to know how much my 400W PSU can handle, just in case it's that causing the problem. I've got a Palomino Athlon XP 1800+, Gigabyte GA-7VAX mobo, Seagate 80GB 7,200rpm HD, CD-ROM, three 12V fans, Volcano 7+, two 512MB sticks of PC2700 DDR RAM, and a RADEON 9000 PRO, running on WinXP Pro. I'm planning on putting in another six 12V fans (please don't hit me).

James

O Random resets are a pretty common problem, which can be caused by a number of things. It's probably not a software problem, though.

The number one suspect in cases like this is always the power supply. A 400W PSU should have no trouble at all running a system like yours – a good 300W PSU would be fine, for that matter, though maybe not if you install all of those extra 12V fans. But any PSU can develop problems, and there are lots of lousy PSUs out there with impressive power ratings.

The first thing to try is better cooling, because trying that doesn't cost anything. An overheating CPU (or other component) can cause semi-random crashes and hangs. So take the side off the case, point a desk fan in there, and see if the problem goes away. If it does, then your CPU cooler isn't properly fitted, or your case ventilation is lousy (not enough fans, clogged fan grilles, awful cable layout. . .), or something's covered with a blanket of dust, or your video card or motherboard Northbridge chip cooler is dying.

The next thing you can try that doesn't cost anything is yanking inessential components. There's not a lot you can do here with an integrated mobo like the 7VAX; it's got built-in sound and networking, and you don't have a bunch of extra cards and drives. Just the same, you can disable integrated peripherals in the BIOS, and try just one stick of RAM, and then just the other one, and you can unplug your CD-ROM drive.

If the above steps don't help, then get yourself a nice boring brand name 300W or higher PSU – an AOpen, say, – and swap it in. There's a good chance that this will solve the problem. Even if it doesn't, a spare PSU isn't

very expensive, and is a handy thing to have.

If the problem persists, then it might be the RAM. Even if you still get resets when you're using either memory module singly, it's possible that they're *both* bad. Buy or borrow a known-good module and try that by itself.

If none of this helps, the next step is to try swapping out the motherboard.

Ultra drives

I am looking to create the ultimate system, and I have been looking at the Gigabyte GA-8KNXP Ultra. Ultra320 SCSI is included on the board, and I was wondering if SCSI has considerable advantages when it comes to gaming because of its speed? Also, current normal PCI slots have a peak bandwidth of 133MB/s; is that a limiting factor if you install an SCSI card in one?

Toby Roberts



RIGHT: If your 15,000rpm SCSI drive misbehaves, poke around inside. Soon you'll have a whole other problem.

O SCSI super-drives aren't a good choice for desktop machines. A high-priced 15,000rpm SCSI hard drive may well load a big fat game *slower* than a commodity 7,200rpm drive. This is because SCSI server drives top out at capacities well under 100GB, while commodity drives with capacities well above 200GB are commonly available.

If you've got three times as much capacity, three times as much data passes under the heads per second. That triples your sustained transfer rate, all other things being equal. So a 15,000rpm 73GB drive is only mechanically capable of 61 percent of the sustained transfer rate of a 7,200rpm 250GB drive.

The SCSI drive has superior seek speed, because of its faster-moving head assembly and reduced rotational latency (time for the disk to spin around so needed data comes under the heads). But that often won't save it, for single-user desktop purposes.

The big deal about fast SCSI drives is that they're more reliable (provided you keep them cool) than commodity drives, and can relatively easily be built up into a big RAID array with much better performance than *any* single drive. For desktop users, though, they wouldn't be an obviously superior option even if they cost the same. Which they don't – high spindle speed SCSI drives are five to 10 times as expensive per gigabyte as 7,200rpm IDE models.

As you say, regular 32-bit, 33MHz PCI doesn't have bandwidth anything like that of Ultra320 SCSI. Plain PCI's ceiling is 133 *million* bytes per second, which is only 127 1,048,576-byte megabytes per second. Each individual PCI slot doesn't get its own 127MB/s, either; the whole PCI bus shares it, with plenty of overhead. Even if you only install one card, you're still sharing bandwidth if you've got any ATA (IDE) devices; they transfer data over the PCI bus too.

64-bit PCI ('long' PCI slots, which you won't see on many boards not meant for servers) is inherently twice as fast as 32-bit, and can be twice as fast again if it's running at 66MHz, and twice as fast *again* if it's running at 133MHz. 64-bit PCI at 133MHz is 'PCI-X', which has plenty of bandwidth for even quite serious drive arrays. But you only get that performance if everything connected to the bus is capable of running at its full speed; you can't mix in any slower cards and maintain full speed.

CD speed redux

In your reply to the 'MUST... .GD... .FASTER' I/O letter in Issue 31, you have your information wrong regarding the actual spindle rpm of a CD at 52x.

You state that at 52x, a CD is spinning at 10,920rpm. However, I have read in another computer magazine that it's actually about 16,000rpm faster. That was based on work by a Swedish researcher by the name of Jörgen Stådjé.

According to that article, a CD at 52x is in fact spinning at about 27,000rpm, and in fact it's at this speed or just above when they decide to explode.

Further information regarding this topic can be found at:

www.qedata.se/e_js.htm.

Bradley Parr

OThe CD and DVD overspeed pages on that website don't exist any more (well, they're 'by request' only), but archive.org still has one of them:

http://web.archive.org/web/2002022010535/http://www.qedata.se/e_js_n-cdrom.htm

If you read this carefully, you'll note that Jörgen's not saying what you think he's saying. He's explaining that *if* 52x drives spun at 27,500rpm, discs would routinely fail. But they don't.

The original '1x' CD-ROM drives worked the same way as audio CD players, varying the rotational speed as the read head moved outward across the disc. CDs and CD-ROMs are recorded from the middle outwards, with a constant data rate per unit length of track, so to maintain a steady data rate (which you need to do, for audio), you have to spin the disc faster for the inner tracks than for the outer ones. About 539rpm for the innermost point; about 210rpm for the outermost one (if the disc is full; if it isn't, the head will never get out to the edge).

This is called 'Constant Linear Velocity' (CLV), because a constant length of track passes under the head per second regardless of where it is.



ABOVE: This CD was not, actually, damaged by overspeed. I shot it. As you do.

You don't need a steady data rate for ordinary CD-ROM applications, and it's simpler to make drives that *can* spin at 1x CLV speed for audio purposes, but which otherwise spin at a constant rpm. This is 'Constant Angular Velocity' (CAV). CAV drives are faster for the outer tracks.

Some current drives use some hybrid of CAV and CLV; they vary the disc rotation speed over some but not all of the disc. Nowadays even burners have fast enough write electronics that they just spin at full speed all the time, though.

Drive speed specs are always based on the fastest data rate the drive can possibly manage, on the outer tracks at whatever its top rotational speed is. It won't often actually achieve that; it *can't*, on a disc that isn't full (or being written all the way to the edge), and it won't do it even on a full disc unless it's reading or writing the outer tracks. The speed spec is always the peak speed, though, because that's more impressive.

The 'x' number for a drive is a multiple of the 150KB/s data rate of the original '1x' CD-ROM drives. Those drives were CLV and did 150Kb/s for the whole disc, but modern drives aren't. This is where the mathematical error comes in. If you thought that 1x CD-ROM drives were CAV and spun at 539rpm for the whole disc, and multiplied that speed by 52, you'd get about 28,000rpm. They weren't, though, and modern CAV drives are specified according to their edge-of-disc speed. So you actually need to multiply the *minimum* speed of a 1x drive by the 'x' figure of a modern one to get its real rpm. And 52 x 210 is 10,920.

As Mr Stådjé points out, no 52 x 539rpm drive would survive its first operation!



ABOVE: Are you ever tempted to play GTA while driving a real car?

Eliminate the negative

I I am interested in running a PC in my car (mostly as an MP3 player) and I want to forego the expense and bulk of an inverter and PSU and run the motherboard directly from the car battery (via an arrangement of spike suppression and filtering). I can get +12VDC, +5VDC, +3.3VDC and ground via a simple network of regulators, but not so easy is the -5VDC and -12VDC rails.

My question therefore is, will a modern (Pentium, Athlon, C3 etc.) motherboard run without the negative rails? I know in the old days the -12VDC rail was needed for the serial ports, but these days are they still used or are they just a hangover from the past?

Russ

O -12V is only used for RS-232 serial ports (which use -12/+12V signalling), but the motherboard shouldn't care if there's no -12V rail. The serial ports just won't work.

Pretty much nothing uses -5V these days. Actually, as of v1.2 of the ATX12V specification (see www.formfactors.org/formfactors/atx_ps.htm), PSUs haven't even been required to have -5V output.

Note that if you're running an Athlon, P4 or similarly power-hungry chip from a simple regulator-based PSU, you'll be wasting a *lot* more power as heat than you would if you just got a regular PSU and an inverter. Even if your mobo draws a mere 10 amps from the 3.3V rail, dropping 12V to 3.3 will leave you with 87 wasted watts for that rail alone.

Note also that you *can* create the negative rails from +12V, using one of several 'negative regulator' chips. Note further that native 12V ATX PSUs actually exist, though they're not very cheap – an inverter and a regular PSU will probably cost you less.

Camcorder backup?

I I was told that a DV or Hi8 video camera can be used as a (cheap) form of tape backup for a PC via a FireWire port, managing around 200GB per tape. This strikes me as a viable tape backup device, but I can't find much info on it. Ever heard of it?

Brett Helies

O I don't know whether there's a PC application that allows you to do this, but there's one for the Mac: www.apple.com/downloads/macosx/system_disk_utilities/dvbackup.html

It doesn't manage anything like 200GB per tape, though. A one hour Mini-DV tape is a digital storage device already, with a capacity of a bit more than 11GB.

If you use all of that for user data then you've got no error detection or correction, so real capacity would actually be, as the above Apple page says, 'up to 10GB'. That might even be the *compressed* capacity, which is commonly quoted by backup software companies. They assume everything can be compressed by about 50 percent as you back it up, which is not true at all for a lot of data.

Motherboard CPR

I I have an ASRock G-Pro motherboard with a 1.7GHz Celeron. The board comes with an inbuilt video card, which is only 32MB; when I found this out I installed a GeForce2 64MB video card. I then looked through the BIOS to switch on the AGP slot so the new 64MB card would work; when doing that, I also found that the inbuilt card can be changed from 32 to 64MB. I swapped over to 64MB, saved the BIOS settings and rebooted. Now, every time I turn it on, it comes to a blank screen with no beeps.

How do I reset the BIOS to default if the screen is blank? Or should I just take it to get fixed? I have also removed the GeForce2 thinking that it could be conflicting, but it isn't.

Luke Staudinger

O Try turning the computer on with the Insert key held down. The manual for the G-Pro doesn't say anything about it, but a lot of current motherboards have a feature like this, usually to allow people to recover if they paint themselves into a corner while overclocking. If it's not the Insert key, it may be another; the G-Pro uses the unusual F2 key to enter the BIOS setup, so its emergency reset-to-defaults key may be odd, too.

Cable chasing

I I'm looking for a RADEON 9700 power extension cable (I lost mine). No one seems to supply these cables. Where can I get one in Australia?

Jerry Strzelczyk

O The most common RADEON power cable has a floppy drive power plug on one end, and a pair of hard drive power connectors on the other (one plug, one socket, so you don't lose a PSU connector).

If you want that exact cable then you may be hunting around for a while, but electronics stores often stock some variation on this idea.

One hard drive power socket to two floppy drive plugs, for instance; Jaycar sell that, catalogue number PL-0751, for \$6.40. You can also buy the plugs and sockets separately, and/or cannibalise cables from a dead PSU. Assembling a cable with whatever combination of connectors you like should be a very basic task for anyone who knows how to use a soldering iron.



I tweak therefore I kill. So let's kill stuff. Kill stuff dead. Kill things that get in our way.

Killing applications

'Quadlex' doesn't have all day to wait for applications to die so he can shut down, and neither do you. He sent us these little hacks to try and get the better of wayward processes.

TWEAK: These registry tweaks will help kill recalcitrant applications when you want a quick shutdown:

Under [HKEY_CURRENT_USER\Control Panel\Desktop]
Change 'HungAppTimeout=XXX'. Where 'XXX' is a number
representing a 1/1000 of a second. Changes the delay
before termination of a hung application. Recommend you set
this to 5000, if it isn't already set.

Change 'WaitToKillAppTimeout=XXX'. Where 'XXX' = 1/1000th of a second. Delay before windows starts to shutdown. Recommend you set to 4000.

Make 'AutoEndTasks=1'. Kills all running applications when Windows shuts down. Then under HKEY_LOCAL_MACHINE\System\CurrentControlSet\Control Change "WaitToKillService Timeout" to 4000.

REPLY: Applications hang. Shit happens. Sometimes a perfectly good application will stall, and sit there swinging in the breeze, until task manager finally tells you that it's stopped responding. Only then will it let you end the process. Maybe.

Perhaps you are trying to shut Windows down, and some application that you thought you had closed six hours ago is still sitting in the background, frozen. Even applications that you are currently using can prevent a proper shut down if it needs to complete a write process or other function.

Thanks Quadlex, most tweakers will appreciate these little gems. Be wary using them, however, as you may lose the chance to save your work if you aren't careful when you shut down.

Kill the Outlook Express splash screen

I hate splash screens, and so does 'Nich'. If you want to jump into Outlook and check your mail, why stare at the Outlook Express splash for those two or three seconds? Let's kill that as well.

TIMEBY: How about this one, Simon:

Start Regedit and go to: HKEY_CURRENT_USER\Identities\{Identifier number}\Software\Microsoft\OutlookExpress\5.0

Then create a new DWORD value called 'NoSplash' then double click on it, and give it a value of '1'. And save people those precious seconds.

REPLY: Nich, most excellent! Let's do that. And in fact, in the next issue of *Atomic*, we're going to put our own customised animated toolbar logos into Outlook Express and IE.

Now kill this:

Microsoft got rid of stupid animated help characters from its Office suite, with Office 2000. And a good thing too. They have caused the utterance of more expletives than half the bugs in the product itself.

So why they decided cutesy animations needed to be in Windows XP is anyone's guess. I am talking about the dumb looking puppy dog that rears its dumb looking head in the Search screen. My kids had even once turned it into this stupid looking chick named 'Courtney'. I turned her off with a right click, thinking that was the end of it. But noooo, a few days later I was greeted with 'Earl' a crappy looking alieny thingy.

Someone sent me a .vbs script which supposedly got rid of the thing, but it didn't stick. Can anyone find a way of killing the dog, chick, alien, wizard, blob, cat. . . all of that, for good?

Email your solution to phr33xtw33x@atomicmpc.com.au, and if it works we will publish the fix here for all to use.

Well, let's not kill everything...

Love it or hate it, Microsoft Messenger is an enormously popular instant messenger client. It has a bunch of handy features. There is a utility called Messenger Plus, which adds a plethora of extra functions and settings to MSN.

It will allow you to set custom names for your contacts, allows the creation of keyboard shortcuts for commonly used phrases, it includes a text recall function, and will encrypt and password protect message logs. The handiest feature is the ability to check up to four POP email accounts, instead of just your Hotmail inbox.

If you're regular around the MSN community, take a look at this utility. It's around a 2MB download. Do a custom install, but be careful where you click when installing, however, as you could accidentally agree to install some fairly intrusive ad-ware.

Get MSN Messenger Plus from: www.msgplus.net. It will
r0x0r your s0x0rs.



LEFT: Microsoft Messenger Plus allows you to set custom names for contacts, create keyboard shortcuts for commonly used phrases and check up to four email accounts.

DISCLAIMER:

So let's get the legal stuff out of the way. **Atomic** and AJB accept no liability in the design or execution of the projects contained within this article. These projects and the information contained within are purely for informative purposes and are deemed correct at the time of publication, however are subject to change without notice. Users construct these projects **at their own risk**. **Atomic** and AJB will not be held liable for any damage to hardware, health or financial loss, nor any prosecution from any third party as a result of constructing these projects. It is up to the reader to seek appropriate information and approval from the appropriate governing bodies prior to the construction of any of these projects.

The Cantenna Project

Great Wi-Fi needs maximum range and reception. Phil Chia shows you how with common household bits.

Why do we have to do this? Because Wi-Fi treads a very thin line in the wireless community. Who does this include? If you have a cordless phone, a TV, a mobile phone or a radio, (chances are, as you're reading *Atomic*, you've answered 'yes' to all of the above) then welcome to the community!

Wi-Fi 101

Wi-Fi in the US has caused quite a bit of controversy, and it's only just begun happening over here.

The major problem is that Wi-Fi works in the public unlicensed microwave band. That means that everything from garage door openers to cordless phones and AV repeater devices use the same band. Wi-Fi, or IEEE 802.11, comes in several distinct flavours. For simplicity's sake, I'm going to use the term 'Wi-Fi' instead of 'IEEE802.11'.

All Wi-Fi products work in the Industrial Scientific and Medical (ISM) band which includes 2.4 – 2.5GHz and 5.2 – 5.8GHz microwave frequency.

Things working in this band

generally go unlicensed, with the proviso that some interference is inevitable. Basically, it works on a fair-play principle. It's free to use for everyone, so long as we don't abuse it or deliberately interfere with another persons' devices. In line with this principle is the limitation of transmission power to purposely limit the amount of interference that can be caused. Wi-Fi A and G are able to operate at up to 10W while all the other flavours must operate at no more than 4W. Wi-Fi G users, however, should

be aware that if their systems default back to DSS mode (see later), the maximum signal that they are able to transmit is 4W. That being said, the average power of an access point is a piss-weak 30 – 60mW.

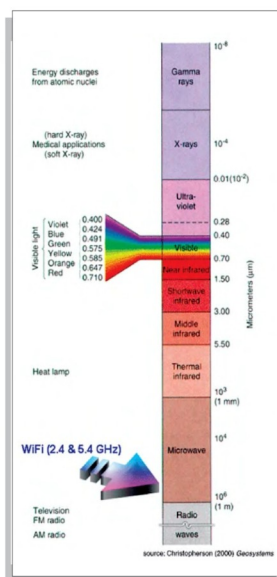
Of course, if you happen to have a 25-metre yagi antenna hanging off your roof and it starts to make your neighbours' cordless phones ring and garage doors open up, expect a visit from the Australian Communications Authority (ACA); the equivalent of the US FCC. They're the good guys here, so do the right thing and take your PIMPed antenna down!

Wi-Fi tech 101

Wi-Fi A is almost extinct in the public field as its range was limited and the hardware was expensive to deploy. Wi-Fi A exists in the corporate market as it had (until recently) the corner on high-speed wireless networks. Wi-Fi A used a technology called orthogonal frequency division multiplex (OFDM) that allowed it to pump through up to 54Mb/s. Luckily, the frequency that Wi-Fi A operates at isn't badly cluttered. It's also this technology that allows Wi-Fi A and G to technically transmit a maximum signal of 10mW.

Wi-Fi B and its speedy cousin, Wi-FiB+ (which isn't a standard; it's just the Texas Instruments' stop-gap between Wi-Fi B and G. It actually works well and is found in some D-Link products) aren't so lucky. The 2.4GHz band is a pig's breakfast, with noise from hundreds of transmission sources. To get around the clutter, Wi-Fi B/B+ uses Digital Spread Spectrum or DSS. This is the same tech used in several cordless phones, and it means that the receiver and transmitters 'jump' subtly around the frequency range. In all, Wi-Fi B cards stay on the same frequency for just 0.8 seconds, meaning that if there's interference, only a few packets need to be resent. From our and the OS's perspective, it's invisible (see Logan Booker's article in *Atomic September 03*). Also, Wi-Fi B allows for 11 discreet 'centre' channels with which cards can communicate on. Think of each channel as a TV station and this is a simple way to avoid interference.

However, each channel uses 22 MHz of bandwidth, resulting in some overlap. You need to be *at least* five



Channel ID	Centre (mean) Frequency (GHz)
1	2.412
2	2.417
3	2.422
4	2.427
5	2.432
6	2.437
7	2.442
8	2.447
9	2.452
10	2.457
11	2.462

Wi-Fi B/B+ Frequency Channels

Implementation	Frequency	Effective Range	Data Rate	Maximum Transmission Power (W)
A	5.2 - 5.8GHz	30m	6 - 54 Mb/s	10
B	2.4 - 2.4835 GHz	60m	11Mb /s	4
B+	2.4 - 2.4835 GHz	60m	22Mb /s	4
B++	Update on Fi B+ that makes it go up to 44Mb /s			4
G	2.4 - 2.4835 GHz	60 - 80m	54Mb/s	10/4
E	Designed to handle A/V streaming. Draft Q3 2004			N/A
i	Update on security and improvement over WEP Draft Expected Q4 2003			N/A

Wi-Fi Specification Summary

channels apart to get zero overlap. This is one of the biggest issues with new Wi-Fi users. So if you're having trouble with your current Wi-Fi setup, try changing the channel! Note that you need both the transmitter and receiver to be on the same channel.

Wi-Fi G is the latest and greatest implementation. Recently ratified by the IEEE, it melds the speed of Wi-Fi A with the distance and inexpensive tech of Wi-Fi B. It uses the OFDM encoding, and has a fallback measure to use DSS if either OFDM fails, or if it comes across a Wi-Fi B access point. This is the stuff to invest in; however in field trials with FreeNode, the fastest we got was 50Mb/s, with an average of 46Mb/s.

The killer: 802.16

Just a small footnote on what the industry is calling the next 'killer app'. . . the 802.11x standard was never meant for long-distance coverage. 802.16 is designed to solve that problem. The spec will use frequencies from 2 - 11GHz and 10 - 66 GHz to span metropolitan areas with 'commercial quality' speeds. That being said, the spec is really intended for building-to-building, although the idea of being able to walk down the street, catch a bus/tram into town and into work

whilst being constantly connected and receiving streaming multimedia is pretty darn cool.

Antennas already!

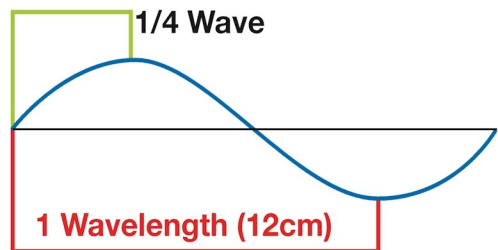
Ok, no doubt all you Dremel heads are raring to go, but first a short rundown on antenna designs and how they work. You'll need it to get the best out of your setup.

First and foremost, understand that antennas are *excellent* conductors. They collect and concentrate energy, which is essentially what radio waves are. This also makes them perfect candidates for lightning, so, *never* go waving your antenna around in the park during a rainstorm, or you'll be sorry!

If you're thinking about mounting your antenna outside, be sure to include a gas-tube lightning arrester in the design and don't forget to *properly* ground the bloody thing! There are lots of stories of people forgetting this essential element and ending up with fried equipment.

OK, enough with the scare tactics. One of the first things to understand about antennas is that they are *converters*. In a nutshell, an antenna converts radio waves into electrical impulses or signals or vice-versa. Another aspect of antennas is that signals are received in $\frac{1}{4}$ wavelengths. That means that an antenna works best if it is tuned to either receive $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or full wavelengths.

Antennas will not give out more signal than what you started with. If you want more signal, you need an amplifier, period. Antennas instead *focus* the signal. Think of a Mag lite torch: on one setting, you get a wide, diffused beam that spans, say, only one metre. On another setting, you get a



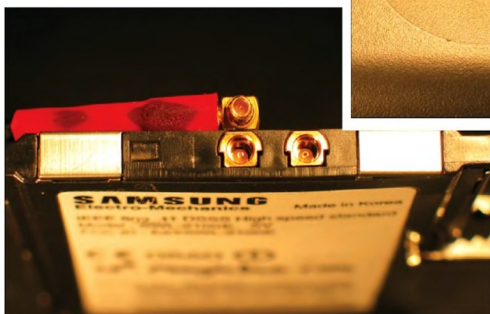
tight beam that lights up five metres, but you can't see what's on either side of the beam.

The ability for an antenna to focus is called gain, and is measured in decibels (dB). Decibels are logarithmic in measurement meaning that every 3dB measurement results in a doubling of the power.

Understand that outside the beam, the power of your transmission drops dramatically. Even a few millimetres' adjustment can mean a huge difference in power. Every

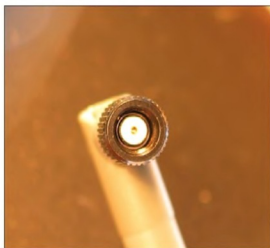
antenna has a 'sweet-spot' and no two antennas are identical.

The second thing to think about is loss. 'Loss is my enemy.' Repeat it as a mantra. Loss of signal (measured again in dB) represents loss of data. Building a -25dB antenna is useless if you get -70dB in loss! In Wi-Fi signals are in terms of milliwatts (mW), and *any* degradation of the signal results in lost packets, speed, or in the worst case scenario, the entire connection.



Loss occurs principally in two areas: the connections and the cable run. Not all cables are made equal. The most common problem with home-brewed antennas is that people use the wrong cables. Simple TV coaxial is great for VHF and UHF, but leaks precious microwave signals. The cables that I'd recommend are LMR by Times Microwave Systems or Belden's 9913. Find them, use them! But no matter what cable you use, you will have loss, so the trick is to try and make your runs as short as possible. In an ideal world, engineers would run antenna directly off the access points. In reality, I've found a 'practical' length to be 1 - 1.5m.

Connectors are another weak-spot, as an incorrectly designed connector can 'leak' the signal. There's a plethora of



connectors available, but for the purposes of this article, we'll just stick to the most common three:

The N connectors are the easiest microwave-level connectors around. SM-As are utilised on high-end access points, such as the D-Links; MC and MMCX are connectors used with Wi-Fi Cards.

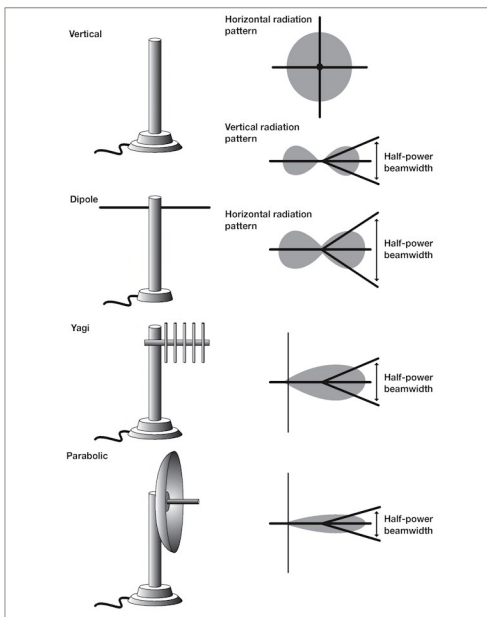
Remember the lightning gas arrester? They usually use N connectors, so don't forget them in the equation!

I can't emphasise enough the importance of having good cables. Microwave connectors are a pain to work with, and a faulty one can cause intermittent faults with your setup. My preference is just to go out and get some professionally made ones. Good cables are worth their weight in gold. Try to go for cables that feature full-metal connectors, with gold-plated inner conductors like the ones illustrated here.

Antenna types and variations

There are many antenna designs out there ranging from your Omni directional, which resembles a stick in the ground, right up to your complex multi-array parabolics. Like a shot gun, omnis are designed to cover a wide area, but only over short distances. On the other side of the spectrum is parabolic, which is like a sniper rifle, and just like its Counter-Strike equivalent, is a pain to use but can have extremely effective results. In-between these two are the Yagi and its variants. Directional, yet not too picky. My personal favourite for, er... site surveys... is a Yagi antenna that incorporates two Yagi elements.

In testing, I've seen parabolic to parabolic transmissions that link up 10km away without even blinking an eyelid. It would pay those who are interested in this kind of long-range communication to have a look around for the now defunct Galaxy TV satellite dishes. Designed and built in Adelaide by Hills Antennas, these are phenomenal microwave dishes. So if



DID YOU KNOW?

The number one appliance for use in the 2.4GHz range is our humble microwave oven? Makes you think twice before wanting to attach that amplifier on your new antenna huh? That being said, the transmitters in our Wi-Fi applications are low powered, so you won't get char-broiled in 30 seconds. That being said though, there have been studies showing increased incidents of cancer with exposure to *low* level microwaves. SO STOP CHASING YOUR BABY SISTER WITH THAT ANTENNA!

you see one on someone's roof, knock on their door and ask if they'd be willing to give up their dish. . .

Tools:

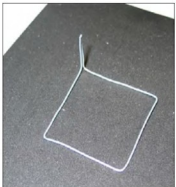
- Soldering iron with decent power
- Pliers
- Small set square
- Metal ruler
- Side cutters
- Flat file/ Dremel

Materials

- 1.5mm copper wire (160mm)
- Male F-type connector, screw in with tag
- Pigtail connection or microwave cable to Wi-Fi card or access point
- Scribe/fine file
- Reflector – any sort of metallic object. Sardine can or a CD will do.
- Glass or a mug for mounting
- Solder

The mod:

We're going to start off with a 'bowtie' antenna. This antenna works in a similar way to the ones found in Wi-Fi cards, however as this is dramatically larger, it'll be a lot more sensitive. It's a variation of a 'sector' antenna and gives good forward directionality.



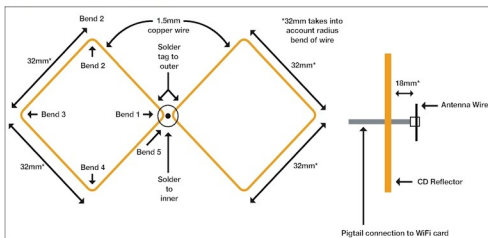
Method:

First, get your copper wire and make it dead straight against your metal ruler. Now measure out 20mm and mark it with your scribe, then 32mm and another 32mm followed by 20mm.

Cut the wire square (file if necessary).

Starting with your middle mark, bend the wire to exactly 90 degrees using your set square as a guide. Repeat at the second and fourth marks, leaving you with a square with overlapping edges. Place the square on a flat surface and bend the overlapping legs perpendicular to the square.

Repeat this procedure and make sure that each square is as close to the other as possible.



Trim the 'legs' back to 18mm, and *be precise*.

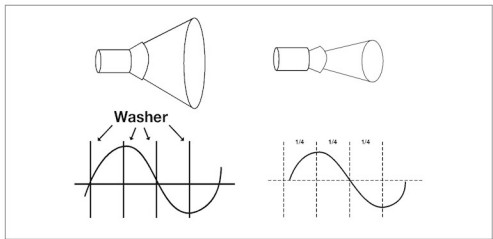
Now fix your F-connector to your reflector (we've used a CD here) by either screwing it down or using a hot glue gun.

Remember your mug? Put the assembly on the mug and solder the illustration. Make sure that the inner legs *do not* touch the shield where the outer legs are soldered otherwise you'll lose 50 percent of your signal straight away.

Connect the antenna to your Wi-Fi appliance and *Voila!*

Antenna 2: Pringles Yagi.

The venerable Cantenna. This antenna works on a *wave guide* principle. As such, it intercepts and transmits the signal wave at every $\frac{1}{4}$ wavelength ($\lambda/4$). The differences in wavelength between Channel 1 and 11 result in a mean $\lambda=12.3\text{cm}$. Remember how I said that we could get a signal at every $\lambda/4$? Well the way a Yagi works is by basically making sure that there's a hunk of metal in 'contact' with the radio wave at every $\lambda/4$ or 3.075cm, so we need to

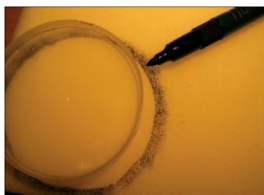


Tools:

- X-Acto scalpel blade
- Texta
- Pliers
- Hot glue gun/Epoxy glue
- Vertical drill press and bit to match plastic bolt thread
- 5mm drill bit
- One hell of a lot of patience
- Metal ruler
- Sandpaper – wet n' dry 1,200 grit
- Scribe
- Set square
- Soldering iron

Materials

- 1x expanded sponge foam, expanded polystyrene or Perspex for a spacer, as wide as a Pringles can. Sponge or Polystyrene must be about 2.5mm thick; Perspex about 5mm or thicker.
 - 1x solid metal rod – external diameter 5.5mm, 55mm length (aluminium, but preferably copper)
 - 5x metal washers (copper preferably). 2.5mm OD, ID 5.5mm
 - 1x female N-Connector
 - 1x plastic bolt with a thread smaller than 5.5mm
- OR
- 1x metal bolt – head 5.5mm
 - 1x 12 G solid copper wire, 50mm.
 - 2x large Pringles cans, washed and dried, WITH LID
 - Solder



be fairly accurate in this measurement.

HB: Copper can usually be found at a plumbing or electrical supplier. Plastic bolts and Aluminium rods are available at Bunnings.



Method:

Wave guide collector assembly
First of all 'polish' the metal rod and the washers with your wet n' dry sandpaper.

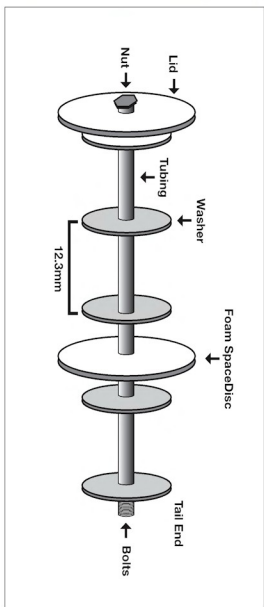
This is to ensure that there's good electrical contact. If you're lucky enough to have found a copper rod (you rich bastard), it'll make for easier soldering later.



Next, carefully mark out 3.075cm (3.1cm if you're lazy) intervals on the rod using either a marker or a scribe. Your 'O' point is where we will insert the plastic bolt. At your last mark, add an extra 2mm (bringing it to 12.5cm) and use the Dremel to cut square. File it down a touch but be careful, you only have 1mm to play with.

Now, mount your metal rod into the vertical drill press and make a hole in it to glue the plastic bolt into the end. The point is that it can support the Collector.

Now use the Pringles' lid as a template and mark around the outside of the lid on the foam or Perspex to make your spacer disk. Cut the foam just inside your mark. It should make a snug fit as your template includes a 0.5mm rim. Perspex



users should slowly sand down the disc until it fits snugly into the Pringles can.

The best way to attack foam is by using an X-Acto blade in a sawing motion. Depending on the density of your foam, an overlapping 'stabbing' motion may also be effective.

Mark in the centre point of the Pringles lid (there's usually an impression there) and carefully start making a hole manually using the drill bits. Increase the hole diameter slowly, so as not to deform the plastic, and only until it can accommodate the bolt.

Now make up the collector array. You want to squeeze the washers onto the rod *slowly* so as not to deform the rod or

the washers. Start assembling the washers in order from the tail end, and don't forget to include the spacer between the third and fourth washers.

Line up your washers as you go along with your set square. You need to make sure that they're exactly perpendicular to the collector rod for maximum Atomical efficiency. If you've managed to find a copper rod, start soldering the washers into position. But don't overdo it; you want just enough to ensure a mechanical and electrical bond. If you're like the rest of us plebs who can't afford copper, then either Araldite or hot-glue gun those babies on. You can try super glue, but I think that there's a chance that it'll get between the washer and the collection rod and form an insulative layer.

Finally, squeeze on the final washer and make it flush with the lid. Add the bolt and epoxy the lot together.

Emitter assembly

This is a simple job. Straighten out your piece of copper wire, cut, square and polish the ends using a Dremel and a file. Now look at your N-connector and figure out where it's going to mount into the Pringles can.

What you need to make sure is that the distance between the inner edge of the Pringles can and the top of the wire is 3.075cm.

Here's where it gets a little tricky, as you can technically mount the F connector in two places. You'll have to play with it and tune it to your setup.

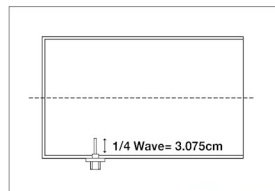
First, I would recommend making a mark on the edge of the condiments list. Usually the printing's pretty much perpendicular to the Pringles tube, but double check using your set square.

Position 1: Measure 15.6cm from the lid and make a mark. This places the emitter ($\lambda/4$) from the collector array

Position 2: Measure 9.225 cm from the base and make a mark. This places the emitter ($\lambda/4$) from the metal reflector base. Take care to measure from the actual base, not the rim

Use a small drill bit to start the hole and slowly increase in size until you can snugly fit your F-connector.

Now, carefully insert the wave guide array and snap the lid on. Hook it up and go for a stroll. . .





Challenge
me.

Surprise
me.

Inspire
me.

AMD
me.

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Prize fighter

② Ultimate retro gamer's pack from GameTraders

Emulators just don't cut it. Sometimes you need pure, un-PC-tainted Super Nintendo controllers and a cartridge to get your pre-32-bit gaming jolly. And there's nothing wrong with that. Truly. To gratify said desires, we have a terrific retro game pack to give away thanks to GameTraders (www.gametradersonline.com.au). The pack contains a SNES with control and four games, including Donkey Kong 2 and Sim City.

Q: What will female Adelie penguins do for a handful of nesting stones?

② Minitar Gigabit five-port switch

Want an Internet backbone in your own home? It's possible, thanks to the insanely fast Minitar Gigabit five-port switch. Really, 100Mb/s is too slow for this day and age, when you and your brother downstairs are swapping episodes of *Red Dwarf* faster than a bullet stuck in the arse of a bat out of hell. There's only one solution, and here's the competition where you can win it, along with two Gigabit PCI cards. Cheers to PC Range for this awesome package deal.

Q: How do Bonobo monkeys resolve conflict?

② Thermaltake LANfire case

Close your eyes and *feel* the case – it's a fabulous sensation of enclosed spaces, whopping fans and electricity. Hey, no peeking. Focus, focus until your eyes hurt and your brain goes numb. Not really getting it? Don't worry, you weren't supposed to. That's why companies like Thermaltake make top cases, so we don't have to have outer-body experiences being one. Here's your chance to win a Thermaltake LANfire case, thanks to Thermaltake Australia and Anyware.

Q: What would cause a female Praying Mantis to eat her partner's head?

② Coolermaster Jet 7 HSF

With all those \$200+ components buzzing in your box, it's amazing to think that the only thing stopping said pieces of silicon from burning like a napalmed forest is good air circulation. The amount of protection required for a piece of hardware rises with its price, so your CPU, being expensive, needs its own cooling solution. *Atomic* wants to help you in this regard, so say hello to the Coolermaster Jet 7 HSF, a dedicated chunk of metal and fan – that you could win – which loves to cool down processors. Cheers to Coolermaster for providing this glorious cooler of CPUs.

Q: What does an African Mole Rat queen do to all her male minions?



EMAIL ENTRIES TO WIN@ATOMICMPC.COM.AU OR POST THEM TO: ATOMIC, PO BOX 2288, STRAWBERRY HILLS NSW 2012. PLEASE SEND A SEPARATE ENTRY FOR EACH COMPETITION. PLEASE ENSURE THE COMPETITION NAME IS THE SUBJECT OF THE EMAIL, OR IS DISPLAYED CLEARLY ON THE FRONT OF THE ENVELOPE. THE CLOSING DATE FOR ENTRIES IS 19 NOVEMBER 2003. WINNERS WILL BE ANNOUNCED IN ATOMIC 36.

Atomic 32 winners: Office Pro MSE Training Course: Q. Why was Tom Hall fired? A: Tom Hall was sacked for 'creative differences' with the 'management' at id Software. J. Leong, East St Kilda, Vic. Quake 3 Signed by John Carmack: Q. Why was Paul Steed fired? A: There was a difference in opinion regarding making a Doom Sequel. A. Speirs, Ryde, NSW. PSU Cable Slewing: Q. Why was John Romero fired? A: John was fired for productivity reasons, once he became famous, he stopped working. R. Lakeman, Ferny Creek, Vic. Warcom Wireless ADSL Router: Q. Who did John Romero make his bitch after his wife left him? A: Stevie 'killcreek' Case. S. Papworth, Austins Ferry, Tas. Vodafone Connect Card: Q. How Did the Palestinian terrorist known as 'the engineer' die? A: Israeli agents succeeded in assassinating Ayyash (aka: 'the Engineer') in the Gaza Strip by detonating a miniature bomb secretly implanted in the cellular phone that he was talking on. K. Payne, Mosman, NSW.

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Mini-sub

Jules Verne was wrong – Nemo isn't dead. He just got a little bit lost, which is kind of like being a little bit pregnant. So for all those on the hunt to find Nemo, *Atomic* wishes you luck on your oceanic voyage under the sea. Send us a postcard if you find the Nautilus. For everyone else who has some semblance of sanity and plans on subscribing or renewing this month, we're giving you the chance to win a Shuttle XPC SN85G4. That's a mini-barebones system packing an Athlon 64 3200+, six-in-one memory card reader and an FN85 nForce3 motherboard. No RAM, but that's easily remedied. Thanks to Shuttle for this delightful little doer.



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There's a point in there somewhere. Anyway, while all you current subscribers are swimming in the great sea of originality, being all creative, we'll be choosing one of you randomly to receive the fantastic ABIT IC7 Max3 motherboard. Cheers to ABIT in Taiwan for this cracking mobo.



>> Atomic 32 winners: M Wallace, New Farm QLD
Current subs (Flight sim): R Iles, Kiama NSW; M Edwards, Warrawee NSW; J Fox, Diamond Creek VIC; P Nash, Wantirna South VIC; M Radespiel, Boronia VIC; M Mulia, Bondi Junction NSW; T Hsu, Eastwood NSW; S Quadflieg, Endeavour

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URBAN TALES

John Simpson explores how technophobes, stupid people and drunken pilots fit into the Atomican world.

Police were baffled by the death of a Sydney man. Upon arrival at the scene, they discovered the man's legs sticking out from under a tip truck, his head crushed by the fallen engine.

Piecing together the clues, the police concluded (by the socket wrench in his hand) that the man had been attempting to steal the truck's engine. But, lacking foresight, he loosened the bolts, causing the block to drop onto his head. A gruesome way to die, but not a great loss to the world's intellectual community by any stretch.

The Internet is chock full of these urban tales, some true and some fabricated (this story is presumably true - it's logged in the Australian Police Journal). From the dead scuba diver stuck in a tree during a bushfire, to the woman who returns from holiday to find spiders hatching under her scalp, urban myths have enjoyed a resurgence. Either the Internet has promoted the propagation of useless information, or the world is becoming progressively more stupid. Probably both.

More often than not, these stories revolve around people and technology. Stupid people seem to have a way of using technology in ways it's simply not meant to be used. It can be as harmless as the old lady who thanked the computer salesman for the slide-out cup holder, or as dangerous as the parachuting instructor that mistakenly strapped his

camera's spare battery to his back. Technology skims the scum from the gene pool.

As masters of our technological domains, we Atomicans avoid the skimmer completely, as we watch this fascinating display from the metaphorical pool deck. The computer is probably the most complicated piece of machinery in the house, and an Atomican can pretty well assemble one blindfolded in around 10.2 seconds (safety disengaged). But consider the rest of the buying public (unfortunately, it's true - people that don't read *Atomic* are permitted to buy PCs). When it comes to computers, many of these people are just flying blind.

A study released last month showed that around half the people with a home computer have basically no idea what it can do. The research from the University of Queensland indicated that 53% of PC owners didn't fully understand how to use it, and '57% of those respondents said they were feeling stressed and anxious if and when they had to explore new features on their computer,' says Dr Neville Meyers, head researcher. Even more remarkable, 15% said they try to avoid using the computer at all.

Compare this to your regular Atomican. Tell them they can't switch on their hotbox for a day and watch the caffeinated beverage fly. It's akin to imposing water restrictions at a wet t-shirt competition - usually resulting in tears

and/or a bucketload of testosterone induced rage. You may as well try getting Lara Flynn Boyle to eat a bacon sandwich.

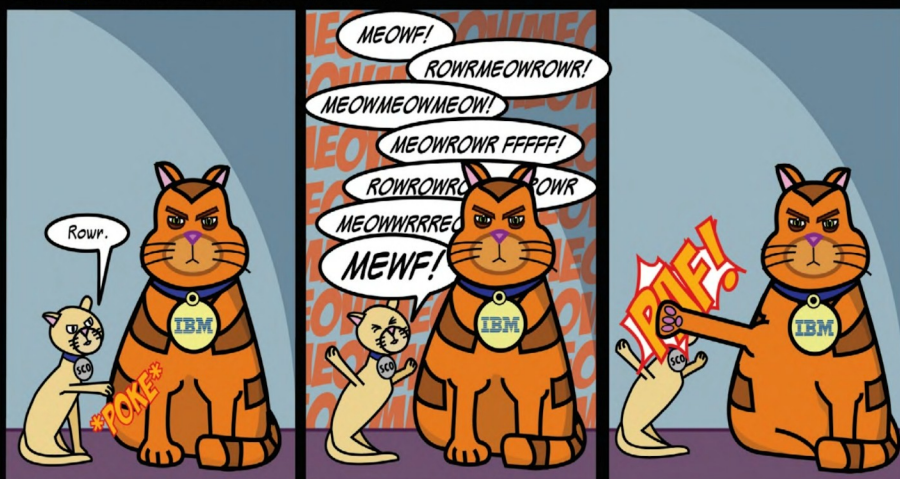
Anyway, you see my point. Maybe if the world were forced to subscribe to *Atomic* and read it cover-to-cover, we wouldn't have so many meaningless deaths under truck engines or elderly fingers caught in CD trays. Alternatively, maybe Atomicans could be *deputized* and roam from house to house, checking for stupid use of technology. Sometimes, though, technological knowledge isn't enough. You also have to know when not to drink too much.

Like the pilot in Massachusetts that landed his plane and routinely locked the stick, then went for a few too many beers. Returning for another flight, he took off at an obscene angle, realising the control column was bolted in place. The key for the lock was on the same ring as the ignition key, so he had a choice: try and get the key off the ring, or pull out the keys and stop the engine.

In his drunken state, he pulled out the keys. While struggling to undo the lock, the plane fell into a nose dive, killing him upon impact. Investigators later found the keys loose on the floor, with the stick lock still firmly in place.

I can see the headlines now: 'Police suspect tight ring and jammed stick cause accident.' Ooo, hellooo officer...

crashtest #7 - SCO VS IBM



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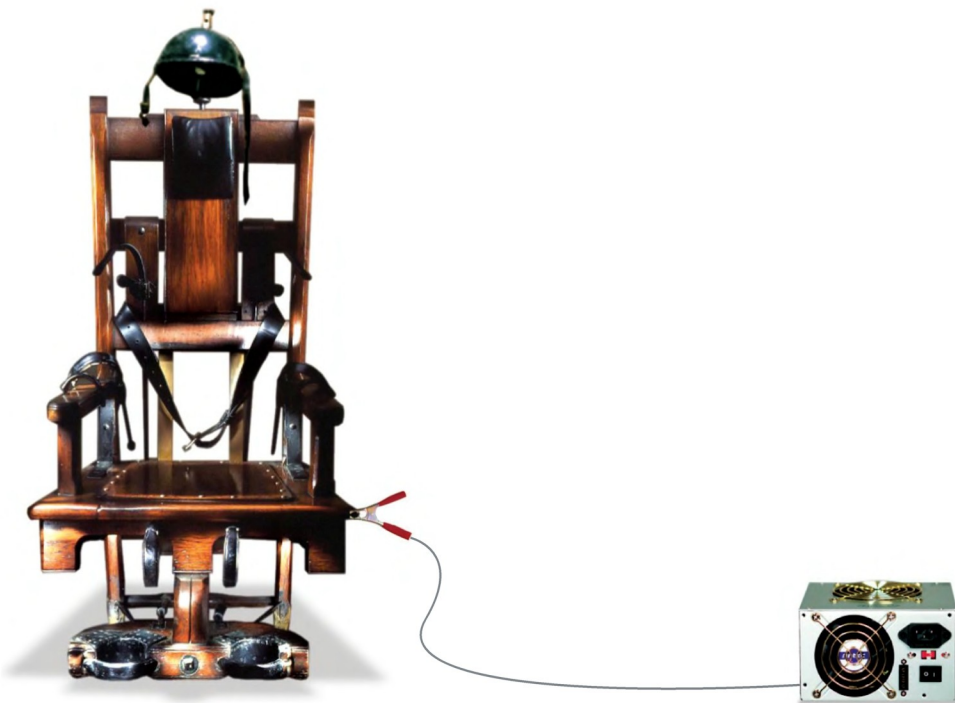
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